DRAFT FINAL
Environmental
Baseline
Survey Report

St. Louis
Army Ammunition Plant
St. Louis, Missouri

Volume I

March 17, 2000

Prepared for:

U.S. Army Aviation
and Missile Command
Redstone Arsenal
Alabama

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ENVIRONMENTAL BASELINE
SURVEY REPORT
VOLUME I**

**ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI**

Prepared for

**U.S. Army Aviation and Missile Command
Huntsville, Alabama**

Date Prepared	:	March 17, 2000
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VOLUME II

EXECUTIVE SUMMARY

This report presents the results of the environmental baseline survey (EBS) performed at the St. Louis Army Ammunition Plant (SLAAP) located at 4800 Goodfellow Boulevard in St. Louis, Missouri. This EBS was completed for the U.S. Army Aviation and Missile Command in Huntsville, Alabama, by Tetra Tech EM Inc. (Tetra Tech) under U.S. Army Materiel Command Contract No. DAAA08-94-D-0007, Delivery Order No. 0054 dated 29 Jan 99.

The EBS was completed in general accordance with American Society for Testing and Materials (ASTM) Method D 6008-96, "Standard Practice for Environmental Baseline Surveys," and ASTM Method E 1527-97, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process."

Based on information in the chain of title, the SLAAP is composed of two parcels totaling 21.05 acres. The parcels were purchased in 1941, the same year that the St. Louis Ordinance Plant (SLOP) was constructed. SLOP was a 276-acre, small arms ordnance plant that produced 0.30- and 0.50-caliber munitions. In 1944, 21.05 acres in the northeast portion of SLOP was converted from a small arms munition plant to a 105-mm howitzer shell plant that was designated as SLAAP. SLAAP manufactured howitzer shells from 1944 to 1945, during the Korean Conflict, and during the Southeast Asia Crisis. In 1989, the Department of the Army determined that the plant was no longer required to supports its munitions mission, and all industrial equipment was removed from the plant. From 1986 to 1990, SLAAP was under the command of the U.S. Army Armament, Munitions, and Chemical Command (AMCCOM). In 1990, plant ownership and control were placed under the U.S. Army Aviation and Troop Command (ATCOM). Currently, the installation is under the command of the U.S. Army Aviation and Missile Command (AMCOM).

Currently, the SLAAP installation has eight unoccupied buildings formerly used to house SLAAP's main operating processes. Tetra Tech conducted a record search and site visit to identify possible areas of environmental concern at SLAAP. The record search indicates that a Notice of Noncompliance (NON) was issued by U.S. Environmental Protection Agency (EPA) Region 7 to SLAAP for polychlorinated biphenyl (PCB) contamination in Building 3. To date, this NON has not been resolved. Records also indicate that underground storage tank (UST) removals at SLAAP have not been closed. Possible sitewide areas of environmental concern consist of possible contamination resulting from possible contaminant migration from the PURO Chemical storage facility (formerly part of SLOP) located south of the

installation, as well as possible friable asbestos-containing materials (ACM) and lead-based paint (LBP) that may be present in SLAAP buildings. The following building-specific possible areas of environmental concern were identified:

- Because of the age of the electrical equipment in Buildings 1, 2, and 4, the equipment may contain PCB-contaminated oil.
- Spilled oil was identified in Buildings 1, 2, 3, and 5.
- Concrete-filled hydraulic oil pits, sumps, and floor drains were identified in Building 1.
- Two pits connected to the sewer system were observed at Building 1.
- Debris was present throughout Buildings 1, 2, and 4.
- Building 2 contained subgrade fuel oil product lines that lead to Building 8.
- PCB- and pesticide-contaminated soil may be present in the former chip chute area in the basement of Building 3.
- Oil staining was present along the far east foundation wall, on the floor, and on support columns in the vicinity of the quench oil pump room in the basement of Building 3.
- Friable ACM-like material and PCB-contaminated metal shavings were observed on the basement floor of Building 3.
- A steel separator tank was identified in the south-central portion of the basement of Building 3. The tank was filled with a dried, oxidized material. This material may be of environmental concern.
- Cracks in the concrete cap were observed on the first floor of Building 3.
- Paint used to seal the steel structures on the first floor of Building 3 was cracking and peeling.
- Fluorescent light fixtures that may contain PCB ballasts were identified in a room on the first floor of Building 3.
- A solvent room with a drain connected to the storm sewer system was identified in Building 3 plans.
- A room on the second floor of Building 3 contained an emergency power supply unit. This unit may contain lead-acid or nickel-cadmium batteries.
- A remote quench oil-fill pipe was located near the northeast corner of Building 3.
- Possible PCB-contaminated compressor oils may have leaked into pits below the compressors in Building 4.

- Ash was observed in a hearth in Building 6.
- Possible leaks and spills from the aboveground storage tanks formerly in Building 8 east of Building 2 are of possible environmental concern.
- Sludge pits were observed in the Acetylene Generation Area.
- Because the UST removal has not been closed, the former location of the quench oil tanks are of possible environmental concern.

Phase I EBS results were presented to the Missouri Department of Natural Resources (MDNR) and U.S. EPA Region 7. The Phase I results were used to develop a scope of work that included completion and sampling of soil borings, installation and sampling of monitoring wells, wipe sampling, surface soil sampling, concrete core sampling, and an ACM survey. The scope of work for investigating the aforementioned possible areas of environmental was discussed with AMCOM and verbally endorsed by U.S. EPA Region 7 and MDNR. Phase II activities were completed in two separate sampling events. The first Phase II sampling event identified areas of contamination and the second Phase II sampling event was performed to further assess and characterize these areas. The data collected during Phases I and II was used to compile the results of the EBS. The EBS conclusions and recommendations are summarized below.

Location	Areas of Environmental Concern	Recommendations
Sitewide	ACM	Manage ACM in accordance with Asbestos Hazard emergency Response Act (AHERA) regulations or requirements
	LBP	Complete LBP assessments and handle accordingly
Building 1	PCB oil-containing electrical equipment	Remove equipment
	PCB oil stain	Decontaminate stained area
	Metal-contaminated soil in east storage area and near sewer connections	Assess extent of metal contamination and maintain barrier
Building 2	Metal contaminated surface soil	Characterize and remove soil
	Contaminated sump water	Characterize and remove water
	Contaminated groundwater	Extent of contamination assessed and no further characterization appears warranted

Location	Areas of Environmental Concern	Recommendations
Building 3	PCB-contaminated concrete floor in basement	Decontaminate, remove, or cap floor
	PCB-contaminated concrete and brick walls in basement and first-floor chip chute areas	Decontaminate, remove, or cap walls
	Material in steel separator tank	Characterize and remove material
	Airborne pesticides detected in basement	Cap east side of basement
	Cracked and peeling paint and concrete floor	Repair as necessary
	Semivolatile organic compound (SVOC) and PCB-contaminated soil underneath loading dock	Assess and remediate soil
	PCB-contaminated drain and sump water	Characterize and remove water
	PCB-contaminated elevator equipment and oil stains in penthouses	Decontaminate or remove equipment or stains
Building 4	PCB oil-containing electrical equipment	Remove equipment
	PCB oil stain under electrical equipment	Decontaminate stained area
	PCB oil-stained transformer pad	Decontaminate stained area
	PCB-contaminated material in air compressor pits	Characterize and remove material
	SVOC-contaminated soil	SVOC contamination appears to be background condition and no further characterization appears warranted
Building 5	PCB-contaminated elevator equipment and oil stains in penthouse	Decontaminate or remove equipment and stains
	SVOC-contaminated soil	SVOC contamination appears to be background condition and no further characterization appears warranted
Building 6	Metal-contaminated ash in hearth	Characterize and remove ash
Building 7	No areas of environmental concern	No further characterization appears warranted
Building 8 and 8A	SVOC contaminated soil with extent assessed	Extent of SVOC contamination assessed and no further characterization appears warranted
Buildings 9 and 9a through 9D	No areas of concern	No further characterization appears warranted

Location	Areas of Environmental Concern	Recommendations
Building 10	Leaking UST incident extent assessed	No further characterization appears warranted; request MDNR to close LUST incident
Building 11, 11A, and 11B	SVOC contaminated soil with extent of contamination assessed	No further characterization appears warranted

Also, rubbish, fluorescent lamp ballasts, and LBP chips need to be characterized and disposed of.

If additional information becomes available to Tetra Tech that suggests that the areas or issues of environmental concern identified in the EBS are erroneous or need revision, the recommendations in the report may be revised accordingly.

1.0 INTRODUCTION

This report presents the results of the environmental baseline survey (EBS) performed at the St. Louis Army Ammunition Plant (SLAAP) located at 4800 Goodfellow Boulevard in St. Louis, Missouri. This EBS was completed for the U.S. Army Aviation and Missile Command (AMCOM) in Huntsville, Alabama. The U.S. Army Materiel Command has determined that the SLAAP is excess to its current and future mission requirements and is in the process of evaluating the environmental condition of the property. It is Department of the Army policy to prepare an EBS in order to determine the environmental condition of a property being considered for acquisition, transfer, outgrant, or disposal. Therefore, the SLAAP EBS was conducted to identify potential environmental liabilities associated with real property transactions and to provide documentation that may be required for property transfer and/or disposal. This section summarizes contract information, the scope of work, and property background information.

Sections 2.0 through 14.0 of this report are organized as follows:

- Section 2.0: Project Approach
- Section 3.0: Property Description
- Section 4.0: Environmental Setting
- Section 5.0: Environmental Record and Database Search Results
- Section 6.0: Historical Property Description
- Section 7.0: Adjacent Property Uses
- Section 8.0: Site Inspection Summary
- Section 9.0: Current Environmental Actions
- Section 10.0: Possible Areas of Environmental Concern
- Section 11.0: Phase II EBS Activities
- Section 12.0: EBS Investigative Results
- Section 13.0: Conclusions and Recommendations
- Section 14.0: References

1.1 CONTRACT INFORMATION

Tetra Tech was contracted to AMCOM under U.S. Army Materiel Command (AMC) Contract DAAA08-94-D-0007, Delivery Order 0054 dated 19 Jan 99. Tetra Tech, AMCOM, AMC, the Missouri

Department of Natural Resources (MDNR), and General Services Administration (GSA) attended a project startup meeting on 02 Feb 99.

1.2 SCOPE OF WORK

The scope of work for the EBS consists of identification of possible areas of environmental concern that may be present on site or on the surrounding adjacent properties and that may pose an environmental liability for the subject property owner. The EBS was completed in general accordance with the scope of work detailed in Appendix A and with American Society for Testing and Materials (ASTM) Method D 6008-96, "Standard Practice for Environmental Baseline Surveys," and ASTM Method E 1527-97, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." AMCOM had met with EPA Region VII and the MDNR to request additional guidance for sampling. Results of this additional sampling requested by EPA Region VII and MDNR was incorporated into this EBS.

1.3 PROPERTY BACKGROUND

The SLAAP property consists of a 21.05-acre improved parcel. Currently the parcel has eight unoccupied buildings that were used to house the main operating processes of SLAAP. In 1941, the St. Louis Ordinance Plant (SLOP) was constructed. SLOP was a 276-acre, small arms ordnance plant that produced 0.30 and 0.50 caliber munitions. In 1944, 21.05 acres in the northeast portion of SLOP was converted from small arms munition to 105 millimeter (mm) howitzer shell production and was designated as SLAAP.

After World War II, SLAAP was placed on standby status. It was reactivated from Nov 51 to Dec 54 and again from Nov 66 to Dec 69 to support 105mm howitzer shell production. The plant was maintained by the Chevrolet Shell Division of General Motors from 1951 until 1958, when the maintenance contract was assumed by the U.S. Defense Corporation. General Motors, Chevrolet Motor Division assumed responsibility for plant maintenance and operations from 1966 until 1972, when Donovan Construction Company was awarded the maintenance and surveillance contract.

In 1984, buildings at SLAAP were renovated for subsequent use by over 500 personnel from the U.S. Army Aviation Systems Command (AVSCOM). From 1986 to 1990, SLAAP was under the command of the U.S. Army Armament, Munitions, and Chemical Command (AMCCOM). In 1989, the Department of

the Army determined that the plant was no longer required to supports its munitions mission, and all the industrial equipment was removed from the plant. In 1990, plant ownership and control were placed under U.S. Army Aviation and Troop Command (ATCOM). As of 1993, plant maintenance and surveillance activities were being subcontracted by Donovan Construction Company to Plant Facilities and Engineering, Inc. (PFE). Currently, the facilities are vacant and under control of AMCOM since 1998.

2.0 PROJECT APPROACH

The project approach discussed in this section was used to complete the EBS. Additionally, most of the information gathered for this report has been placed in concise tables for ease of use. In accordance with the requirements of the ASTM methods, the EBS was conducted using the following four tasks:

- Historical search
- Assessment of current environmental condition
- Identification of areas of possible environmental concern
- Assessment of areas of possible environmental concern
- Identification of areas of environmental concern
- Development of recommendations

These four tasks are summarized below.

2.1 HISTORICAL SEARCH

The historical search was divided into the following categories:

- SLAAP property pre-1941
- SLAAP property post-1941
- Past adjacent land use

The historical search was divided into these three categories for the following reasons: prior to 1941, the property was not owned by the United States Army; after 1941, the property was improved, and the plant manufacturing process remained basically the same; and past adjacent land use could be easily reviewed using the information collected during the SLAAP historical search. Past studies of SLAAP, a title search, historical aerial photographs, environmental database search results, Sanborn fire insurance maps, and interviews were all used to complete the historical search for SLAAP and the adjacent properties. The search results are discussed in Sections 6.0, 7.0, and 9.0.

2.2 ASSESSMENT OF CURRENT ENVIRONMENTAL CONDITION

The current environmental condition of SLAAP and the adjacent land was assessed during a site inspections in February, June, July, and September 1999. To ensure consistency throughout the entire EBS, the site inspection team consisted of the personnel who completed the historical search for SLAAP. The inspection team was supplied with disposable cameras, building figures, and checklists in accordance with ASTM EBS and Phase I environmental site assessment (ESA) requirements for site inspections. Any areas of possible environmental concern observed during the site inspection were photographed, located on the figures, and described on the checklists. A summary of the site inspection is Section 8.0.

2.3 IDENTIFICATION OF AREAS OF POSSIBLE ENVIRONMENTAL CONCERN

Data obtained during the historical search and site inspection was compiled to identify possible areas of environmental concern. These areas were then evaluated based on the results of previous investigations and remediation activities and were screened out, if applicable. Once the possible areas of environmental concern were identified, the areas were divided by building number to assist in development of recommendations for additional environmental characterization. Possible areas of environmental concern identified during the EBS consist of areas of petroleum storage and use, areas suspected of having asbestos-containing material (ACM), areas suspected of containing lead-based paint (LBP), radon exposure areas, areas of hazardous material storage and use, pits, lagoons, areas of stained pavement, and solid waste storage areas. These areas are described in Section 10.0.

2.4 ASSESSMENT OF AREAS OF POSSIBLE ENVIRONMENTAL CONCERN

The Phase I assessment results of SLAAP warranted additional subsurface investigations to assess if possible environmental concerns did pose a threat to human health or the environment. The scope of work for the initial Phase II was presented to EPA Region VII and the MDNR. After incorporating the recommendations of EPA Region VII and the MDNR, the Phase II was completed. Results of the Phase II investigation indicate that additional investigations were required. The second Phase II scope of work was compiled and presented to EPA Region VII and the MDNR. After endorsement of the scope of work, these activities were completed. These activities are summarized in Section 11.0 and the results are summarized in Section 12.0.

2.5 DEVELOPMENT OF RECOMMENDATIONS

The possible areas of environmental concern identified during the EBS were prioritized based on human health and environmental threats. Recommendations were then developed in the form of a scope of work that may be used to characterize areas that may be sources of environmental liability during the property transfer process. The recommendations are included in Section 13.0.

3.0 PROPERTY DESCRIPTION

This section identifies the SLAAP property's location, provides a legal description of the property, and presents title search results for the property.

3.1 LOCATION

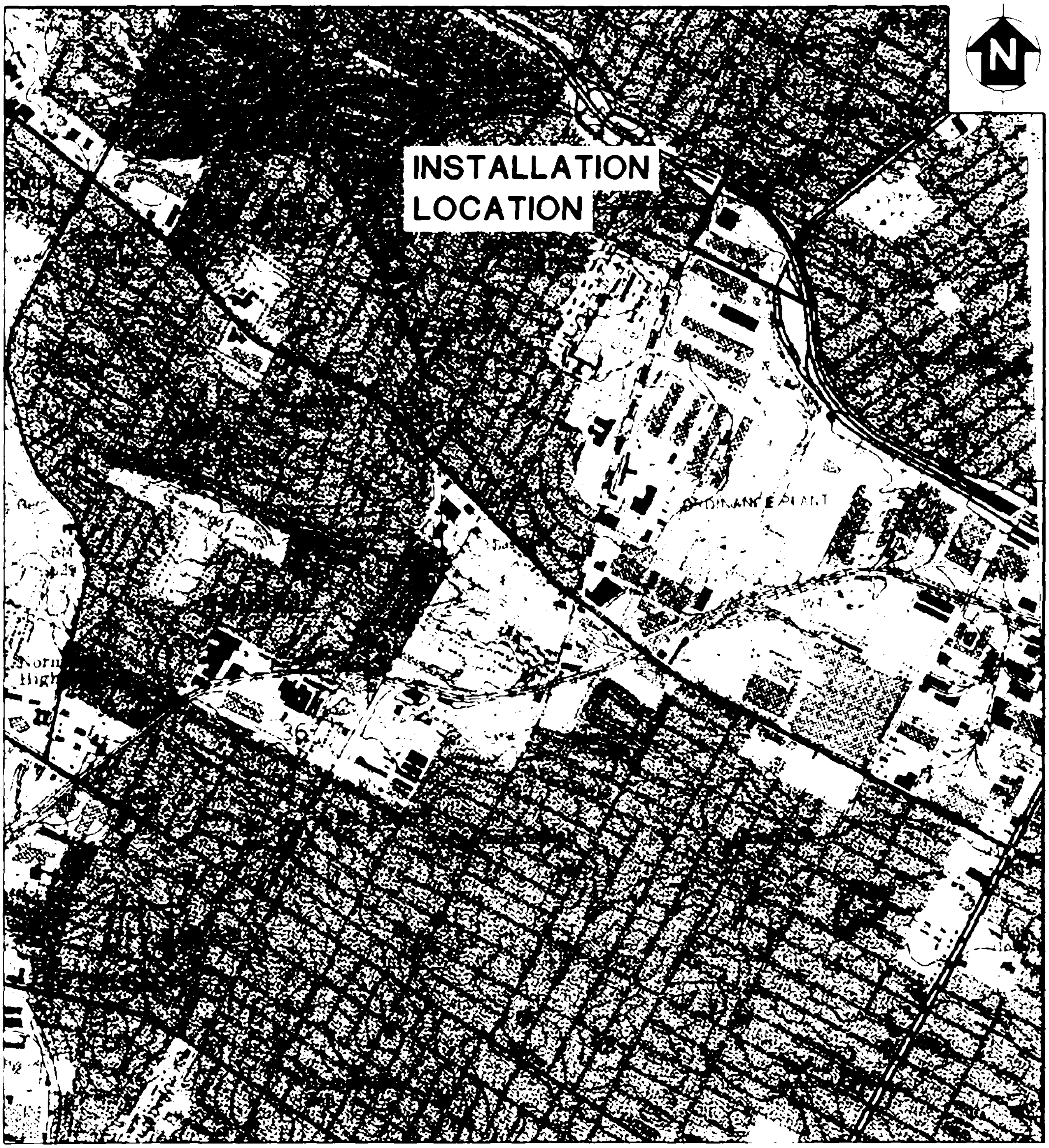
The SLAAP property is located at 4800 Goodfellow Boulevard in St. Louis, Missouri, at 38°41'53" N and 90°15'48" W. The installation location is shown in Figure 3-1.

3.2 LEGAL DESCRIPTION

The SLAAP property consists of a 21.05-acre, improved area. According to the following legal description, the property consists of two separate parcels, A and B:

- **Parcel A:** Beginning in the east line of Goodfellow Boulevard (100 Ft. Wide), at the southwest corner of Lot 12 in City Block 4338 BW; thence S 60°41'45" E, 230.0 feet to a line between City Blocks 4338 BW and 4338 BE; thence with said line N, 29°05'30" E, 7.0 feet to its intersection with the extension westwardly of the south line of Lot 42 in City Block 4338 BE; thence with south line of said lot, S, 60°41'45" E., 147.5 feet to the west line of an alley (15 Ft. Wide) in City Block 4338 BE; thence with the west line of the above mentioned alley S, 29°05'30" W, 370.0 feet to the south line of an alley (20.0 Ft. Wide), said alley being the north twenty (20) feet of a part of what was formerly Windham Avenue; thence with the south line of said alley S 60°41'45" E, 192.5 feet to the extension southwardly of the east line of Woodstock Avenue; thence with the east line of Woodstock Avenue N 29°05'30" E., 44.68 feet to the southwest corner of City Block 6110; thence with the south line of said City Block 6110 S 60°54'45" E., 593.07 feet to the southeast corner thereof, said corner being on the west line of Riverview Boulevard S 29°05'15" W. 307.49 feet to a point of curve; thence on a curve to the left having a radius 930.78 feet a distance of 108.78 feet; thence N. 60°50'30" W. 1170.07 feet to the east line of Goodfellow Boulevard (100 Ft. Wide); thence with said east line N. 29°05'30" E. 735.41 feet to point of beginning.

- **Parcel B:** Beginning in the east line of Goodfellow Boulevard (100 Ft. Wide), at the southwest corner of Lot 12 in City Block 4338 BW; thence with the east line of said Goodfellow Boulevard, N 29°05'30" E. 300.0 feet to the northwest corner of Lot 24 in City Block 4338 BW; thence S 60°41'45" N., 67.5 feet to the west line of an alley (15 Ft. Wide) in said City Block 4338 BW; thence with the west line of said alley N. 29°05'30" E., 103.21 feet to its intersection with the south line of Lillian Avenue (60 Ft. Wide); thence with said south line S. 60°17'30" N., 310.0 feet to the west line of an alley (15 Ft. Wide) in City Block 4338 BE; thence with the west line of the above mentioned alley S. 29°05'30" W. 484.28 feet to the southeast corner of Lot 42 in City Block 4338 BE; thence with the extension westwardly of the south line of said lot, N. 60°41'45" W.,



SCALE 1:24000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

SCALE 1" = 2,000'

LEGEND

- Primary Highway
- Light-Duty Road
- Railroad

NOTE: All pink shading represents residential areas.

SOURCE: MODIFIED FROM USGS, CLAYTON, MISSOURI, QUADRANGLE, 1993

MISSOURI

Quadrangle Location

ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 3-1
INSTALLATION LOCATION

Tetra Tech EM Inc.

147.5 feet to its intersection with the line between City Blocks 4338 BE and 4338 BW; thence with said block line S. 29°05'30" W. 7.0 feet to its intersection with the extension eastwardly of the south line of Lot 43 in City Block 4338 BW; thence N. 60°41'45" W. 230.0 feet to the point of beginning.

3.3 TITLE SEARCH RESULTS

Nationwide Environmental Title Research was retained to prepare a chain of title back to 1900 for the SLAAP property. Based on information in the chain of title, the property has been owned by the United States Army since 4 Apr 41. From 7 Aug 30 to 4 Apr 41, the property was owned by General Electric Realty Corporation. A portion of the property was owned by General Electric Company from 4 Jan 26 to 7 Aug 30. The Essandee Company owned the property from 26 Aug 22 to 4 Jan 26. C.N. Shannon was the property owner from 23 Sep 19 to 26 Aug 22. Prior to 23 Sep 19, the property was owned by C. Shulte. The chain of title is presented in Appendix A.

4.0 ENVIRONMENTAL SETTING

This section summarizes SLAAP's environmental setting. Specifically, this section addresses the topography, regional geology, hydrogeology, endangered species, archeological information, and wetlands associated with the SLAAP property.

4.1 TOPOGRAPHY

SLAAP is located in the southern portion of the Dissected Till Plains Section of the Central Lowland Province. The topography of this area consists of rolling uplands with slopes between 2 and 5 percent, and elevations range up to 550 feet above mean sea level (msl). The SLAAP property is nearly flat and slopes gently to the south; the property lies at an elevation of about 120 feet above msl. The SLAAP property is bounded on the north by Interstate 70 (I-70), on the west by Goodfellow Boulevard, on the south by PURO Chemical Division (PURO) (located in a portion of the former SLOP site), and on the east by Riverview Boulevard (USATHMA 1979).

4.2 REGIONAL GEOLOGY

The geology of the SLAAP property includes surficial deposits consisting of windblown silts and clays known as loess. The loess was derived from the Missouri River flood plain during the Pleistocene Age about 2 million years ago. The Loess is overlain by a layer of clay and silty clay alluvium. Based on soil borings drilled to investigate underground storage tanks at the installation, the layer of alluvium ranges from 20 to 25 feet in thickness and the loess layer ranges from 40 to 45 feet in thickness (USAEHA 1993). Loess deposits are present to about 25 feet below ground surface (bgs), and silty clays and clays are present to about 20 feet bgs at the SLAAP property. Except for 3 acres of the SLAAP property, most of the ground surface is covered by asphalt or buildings.

Bedrock in the area consists of flat-lying sedimentary formations made up mostly of limestone and dolomite. A slight, regional northeast dip has been modified by several minor, northwest-southeast trending folds or flexures. A soil test boring drilled in 1971 at the SLAAP property encountered medium-hard, light gray, medium- to fine-grained limestone at 64.9 feet; this is known to be Ste. Genevieve limestone of the Mississippian Age and is overlain by 42.6 feet of medium-hard, light yellow to gray, sandy clay shale of the lower Pennsylvanian Age (USATHMA 1979).

4.3 HYDROGEOLOGY

All bedrock units in and around St. Louis are capable of yielding varying amounts of water to wells. Yields to wells depend on site specific geologic and well characteristics. Most wells in the St. Louis area yield a maximum of 49 gallons per minute from depths down to 800 feet. These wells are screened in limestones and sandstones ranging in age from Mississippian to Ordovician. Water yields of up to 1,955 gallons per minute can be expected from wells drilled in thick, alluvial deposits; that contain little silt or clay-sized material. However, no potable water wells are reported to exist within 3 miles downgradient of the installation (ESAEHA 1993).

Groundwater flow in the SLAAP area is to the north-northeast toward the Mississippi River. The drainage of St. Louis County terminates in the Missouri River to the north, the Mississippi River to the east, and the Meramec River to the south. No surface water is present on the SLAAP property. Rainwater that falls on the property is collected by catch basins that discharge to the St. Louis combined sewer system.

4.4 ENDANGERED SPECIES

The SLAAP property is covered by buildings and asphalt, and the closest body of water is the Mississippi River, which is about 3 miles from the property. No endangered or threatened species have been identified on the property. According to the Missouri Department of Conservation, the acquisition transfer, outgrant, or disposal of the SLAAP property will not impact any endangered species or other sensitive environmental concerns in the vicinity of the property (Missouri Department of Conservation 1993). In addition, SLAAP has no impact on Mississippi River endangered animal and plant species because of the property's distance from the river (DOI 1995).

4.5 ARCHEOLOGICAL INFORMATION

SLAAP is located across the Mississippi River from the American Bottoms archeological region. In 1985, an archeological overview and management plan was prepared for SLAAP. According to the plan, there are no known or identifiable potential archeological sites on the SLAAP property (Woodward-Clyde Consultants 1985). Because most of the SLAAP property is asphalt-paved or contains structures, much of it has been impacted by some type of ground disturbance. Therefore, it is doubtful that any surficial archeological sites remain on the SLAAP property. However, the existence of subsurface archeological deposits is possible (Woodward-Clyde Consultants 1985).

A letter from the MDNR, Division of State Parks, dated 21 Jun 94, indicates that none of the SLAAP structures are eligible for inclusion on the National Registry of Historic Places (MDNR 1994).

4.6 WETLANDS

The SLAAP property area was examined to identify all surface water bodies and wetlands. Specifically, the area within 2 miles of the property was examined using an overview map based on the National Wetlands Inventory of 1994. According to the overview map, the closest wetland is approximately 1.4 miles east of SLAAP, and another wetland lies approximately 1.5 miles northwest of SLAAP (EDR 1999). No wetlands were identified on the SLAAP property or in its immediate vicinity.

5.0 ENVIRONMENTAL RECORD AND DATABASE SEARCH RESULTS

This section summarizes the review of environmental records and databases maintained by the Army and by state and federal agencies. Specifically, this section discusses the review of available SLAAP records held by U.S. Environmental Protection Agency (U.S. EPA) Region 7, MDNR, and the Army and available government environmental database information prepared by Environmental Data Resources, Inc. (EDR).

5.1 U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 7 RECORDS

U.S. EPA Region 7 was contacted to obtain copies of environmental documents held by U.S. EPA Region 7 pertaining to SLAAP and adjacent facilities. Copies of records were obtained through a Freedom of Information Act (FOIA) request, which was transmitted to U.S. EPA Region 7 on 11 Feb 99. On 11 Mar 99, two sets of document copies were received from U.S. EPA Region 7. One set of documents was a "SCAP 12, Site Summary Report for non-NFRAP sites located in the area bearing ZIP code 63120" from the WASTELAN Database, Version 17.00. Facilities listed in this site summary report are the (1) Job Corps Center-St. Louis, (2) St. Louis (EX) Army Ammunition Plant, (3) St. Louis (EX) Ordnance Plant (PURO occupies a portion of this site), and (4) USDA OPHS/FSIS Midwestern Laboratory. All these facilities underwent discovery. The SLAAP and SLOP sites were screened by means of preliminary assessments completed on 1 Oct 85. No current evaluations or dispositions are listed for either of these sites. The records provided by U.S. EPA Region 7 were already available among copies of records gathered on 25 Jan 99 during a visit to AMCOM, Redstone Arsenal, Alabama. If any additional documents become available from U.S. EPA Region 7 that provide information about potential environmental concerns at SLAAP, the information and, if necessary, the copies of documents will be provided in an addendum to this report.

5.2 MISSOURI DEPARTMENT OF NATURAL RESOURCES RECORDS

The SLAAP records kept at the MDNR office in Jefferson City, Missouri, were reported by Ms. Diana Bailey at the U.S. EPA Region 7 Superfund Division. Ms. Bailey was contacted, and she stated that copies of the MDNR records were included in the response to the FOIA request to U.S. EPA Region 7. If any documents become available from MDNR that provide information about potential environmental concerns at SLAAP, the information and, if necessary, copies of the documents will be provided in an addendum to this report.

5.3 ARMY RECORDS

Available SLAAP records at AMCOM, Redstone Arsenal, Alabama, were reviewed and copied, as necessary, during the week of 25 Jan 99. The documents copied are listed in Section 9.0 of this report. A few additional documents relevant to SLAAP were available at the Charles Melvin Price Support Center in Granite City, Illinois; these documents are also listed in Section 9.0. In addition, selected design drawings were available in a room on the first floor of Building 3 and were reviewed during the site visit of 22 and 23 Feb 99.

5.4 FEDERAL AND STATE ENVIRONMENTAL DATABASES

Available government database information prepared by EDR (1999) was reviewed to evaluate (1) the SLAAP property and (2) any listed sites within ASTM-recommended search distances that might impact the SLAAP property (see Appendix B). Listed below are federal and state environmental databases whose information was reviewed; also listed is the search distance from the site associated with each database.

Database	Search Distance (miles)
National Priorities List (NPL)	1.125
Corrective Action Report (CORRACTS)	1.125
State List of Hazardous Waste Response Sites (SHWS)	1.125
Resource Conservation and Recovery Information System (RCRIS) Transport, Storage, or Disposal Facilities	0.625
RCRIS Listed Small-Quantity Generators (SQG)	0.375
RCRIS Listed Large-Quantity Generators (LQG)	0.375
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)	0.625
CERCLIS No Further Action Planned	0.125
State Landfills	0.625
Leaking Underground Storage Tanks (LUST)	0.625
Underground Storage Tanks (UST)	0.375
Superfund Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Consent Decrees (CONSENT)	1.125

Database	Search Distance (miles)
Former Manufactured Gas Sites (Coal Gas)	1.125
Records of Decision (ROD)	1.125
Toxic Release Inventory System (TRIS)	0.125
Emergency Response Notification System (ERNS)	1.125
Hazardous Materials Incident Report System (HMRIS)	0.125
Toxic Substances Control Act (TSCA)	0.125
Polychlorinated Biphenyls (PCB) Activity Database (PADS)	0.125
Facility Index System (FINDS)	0.125
NPL Liens	0.125
Delisted NPL Sites	0.125
Resource Conservation and Recovery Act of 1976 (RCRA) Administration Action Tracking System (RAATS)	0.125
Material Licensing Tracking System (MLTS)	0.125
Missouri Hazardous Waste Resource Recover Facilities (MORRC)	0.125

The environmental database information review revealed one CERCLIS, one PADS, five FINDS, five RCRIS-SQG, seven LUST, and seven UST facilities within the specified search distances. This site and these facilities are listed below.

Site/Facility	Database	Distance and Direction from SLAAP	Comments
PURO Chemical Division (Part of SLOP) 4700 Goodfellow Avenue St. Louis, MO	FINDS	<1/8 mile southwest	None
Shell Station 4903 Goodfellow Avenue St. Louis, MO	UST, LUST	1/8 to 1/4 mile north-northwest	Soil and groundwater contamination; removal not reported; LUST #LU02037
Future Graphics, Inc. 4616 Planned Industrial Drive St. Louis, MO	RCRIS-SQG, FINDS	1/8 to 1/4 mile south-southeast	No violations found
Madison Warehouse Corporation 4630 Goodfellow Avenue St. Louis, MO	UST, LUST	1/8 to 1/4 mile west-southwest	Contaminated media not reported; cleanup completed on 30 Dec 92; LUST #LU03644

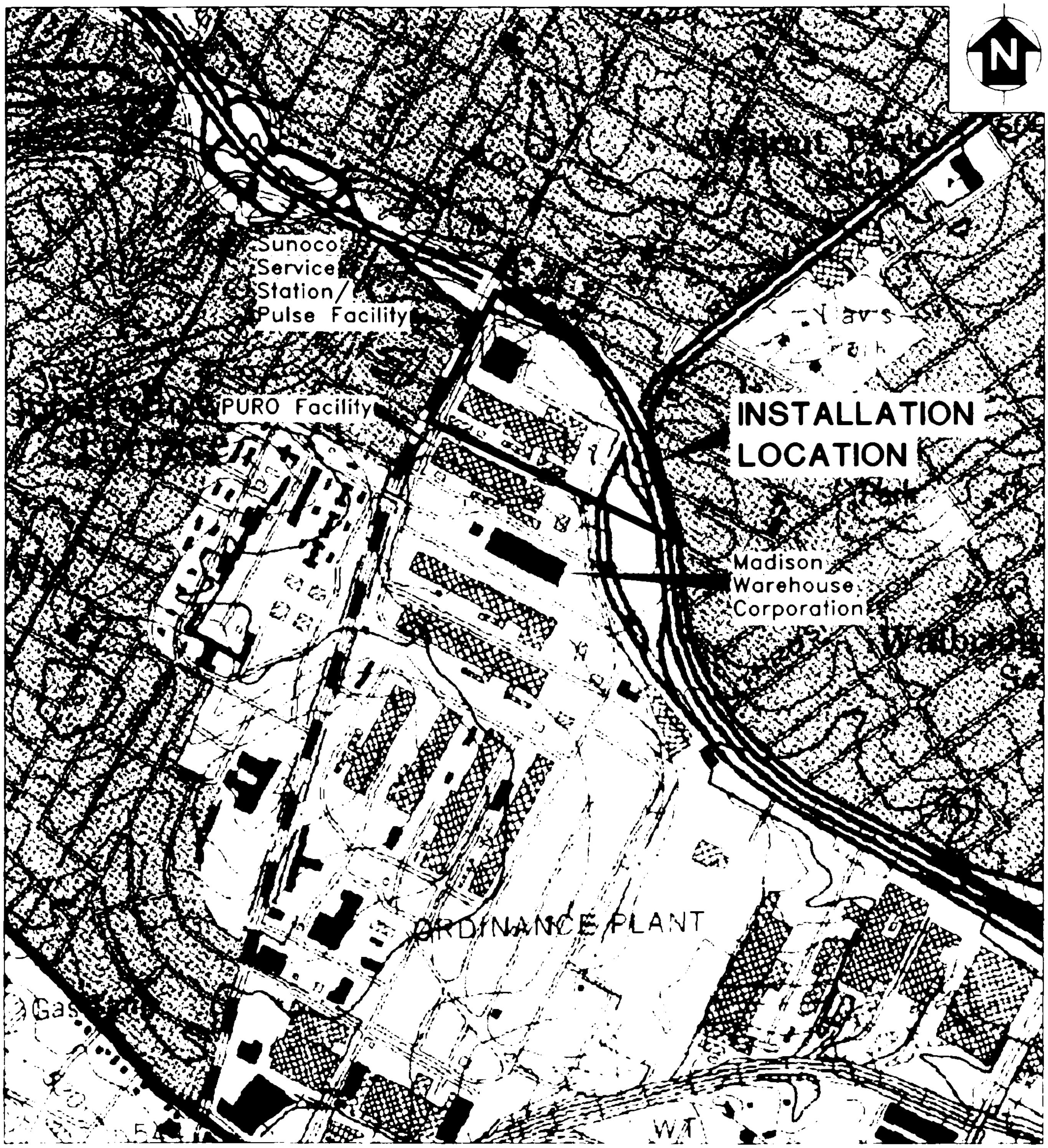
Site/Facility	Database	Distance and Direction from SLAAP	Comments
Madison Warehouse Corporation As Agent 4300 Planned Industrial Drive St. Louis, MO	RCRIS-SQG	1/8 to 1/4 mile south-southwest	No violations found
Pulse 5003 Goodfellow Avenue St. Louis, MO	UST, LUST	1/8 to 1/4 mile north	Soil and groundwater contamination; removal not reported; LUST #LU05905
Sunoco Service Station 5003 Goodfellow Avenue St. Louis, MO	RCRIS-SQG	1/8 to 1/4 mile north	No violations found
McDonnel Aircraft Company Building 72 4500 Goodfellow Boulevard St. Louis, MO	RCRIS-SQG, FINDS	1/4 to 1/2 mile southwest	Two compliance violations reported (date unknown)
Churchill Truck Lines, Inc. 4232 Planned Industrial Drive St. Louis, MO	RCRIS-SQG, FINDS	1/4 to 1/2 mile south	No violations found
Ryder Dedicated Logistics 4232 Planned Industrial Drive St. Louis, MO	UST	1/4 to 1/2 mile south	Regulated by state environmental programs
Vickers Retail #6135 4402 Jennings Road Pinelawn, MO	UST, LUST	1/4 to 1/2 mile west-northwest	Groundwater and soil contamination; cleanup started on 18 Nov 93; LUST #LU04342
Safi Amoco 4207 Jennings Station Road St. Louis, MO	LUST	1/2 to1 mile west	Soil and groundwater contamination; reported on 17 Sep 97; LUST #LU05925
Diamond Gas 5201 Janet Avenue St. Louis, MO	UST, LUST	1/2 to1 mile northwest	Contaminated media not reported; cleanup completed on 25 Oct 90; LUST #LU01697
SLOP 4300 Goodfellow Boulevard St. Louis, MO	PADS, CERCLIS, FINDS	1/2 to1 mile south-southwest	PCB generator, storer, transporter, and permitted disposer
U.S. Army 102D U.S. ARCOM AMSA/55/G 4301 Goodfellow Boulevard St. Louis, MO	UST, LUST	1/2 to1 mile south-southwest	Contaminated media not reported; cleanup completed on 8 Jul 91

Of the facilities listed above, only four appear to be of environmental concern: PURO, the Sunoco service station, Madison Warehouse Corporation, and Pulse. These facilities are higher in elevation than the SLAAP property, and because the regional groundwater flow direction is north-northeast, they are

hydraulically upgradient and less than 1,000 feet from the property, which creates the potential for migration of contaminated groundwater from the facilities to the property. The PURO facility is used for the bulk storage of chemicals. According to local telephone directory information, the PURO facility is also known as Contico Chemical. The Madison Warehouse Corporation and Pulse facilities have had LUST incidents, and the Sunoco service station is an SQG that may have had USTs in the past. Only limited information is available on the PURO facility, which is immediately adjacent to the SLAAP property. A map showing the locations of these sites is included as Figure 5-1.

The other facilities listed above do not appear to present an environmental concern for the SLAAP property based on tank removal information, spill information, their relative topographic locations, and their distance from SLAAP. According to the LUST database, several other LUST incidents at facilities further away from SLAAP have been successfully remediated. The RCRA SQGs located nearby do not appear to present environmental concerns for SLAAP.

A review of the EDR Orphan Summary of unmapped, regulated facilities revealed only one regulated facility, the St. Louis Solid Waste Facility at 1201 Humboldt Avenue in St. Louis, Missouri (see Appendix B). However, facilities not listed in the environmental databases that could store, use, or dispose of potentially hazardous material may exist within ASTM-recommended search distances.



SCALE 1:24000

1/2 MILE 1/4 MILE 0 1/2 MILE

500 0 500 1000 1500 2000 2500 3000 3500 FEET

SCALE 1" = 2,000'

LEGEND

Primary Highway

Light-Duty Road

Railroad

NOTE: All pink shading represents residential areas

SOURCE: MODIFIED FROM USGS, CLAYTON, MISSOURI, QUADRANGLE, 1993

ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 5-1
SURROUNDING FACILITIES
OF ENVIRONMENTAL CONCERN

Tetra Tech EM Inc.

6.0 HISTORICAL PROPERTY DESCRIPTION

This section describes historical uses of the SLAAP property. Section 6.1 describes the property's uses prior to construction of SLAAP. Section 6.2 describes the property's uses after construction of the SLAAP.

6.1 PRE-1941 PROPERTY HISTORY

The review of Sanborn fire insurance maps indicates that portions of the SLAAP property were either residential or vacant (not developed) before construction. Sanborn Fire Insurance Maps were created to inventory flammable chemical storage facilities and buildings for the purposes of assessing fire insurance liability. Because of the details shown on these maps, they provide important historical information regarding on-site chemical storage. Title records indicate that the south portion of the property was purchased by the Army from General Electric in 1941.

6.1.1 Results of Pre-1941 Aerial Photograph Review

Records indicate that an aerial photograph taken in 1937 was in existence; however, this photograph is unavailable for review.

6.1.2 Results of Pre-1941 Sanborn Map Review

The Sanborn fire insurance map of the property completed in 1931 was reviewed. The Sanborn map indicates that the north portion of the property was residential with vacant undeveloped lots and that the south portion of the property was primarily vacant except for a small building in the south central portion of the property. The Sanborn map does not indicate that hazardous or flammable materials were stored on the property. A copy of the Sanborn map is included in Appendix C.

6.2 POST-1941 PROPERTY HISTORY

Title search records indicate that the east half of the property was purchased from General Electric by the Army in 1941. Construction of SLAAP was started in 1941 and completed in 1942. By 1942, Buildings 3, 5, and 9 had been built (see Figure 6-1). In 1944, the property was converted from 0.30-caliber munition manufacture to 105mm howitzer shell production. Chevrolet, Division of General

Motors Corporation, initiated production of shells by Dec 44 with an accelerated schedule to produce 800,000 shells per month by Jun 45 (Ordnance Department undated). The conversion included construction of Buildings 1, 2, 4, 7, 8, 9, 10, and 11 (see Figure 6-1). The production machinery stayed in place on the property until 1988, when it was removed. In 1985, portions of Buildings 3, 5, and 6 were converted to office space; in 1998, these buildings were vacated. The following subsections describe the results of the post-1941 aerial photograph review and historical review.

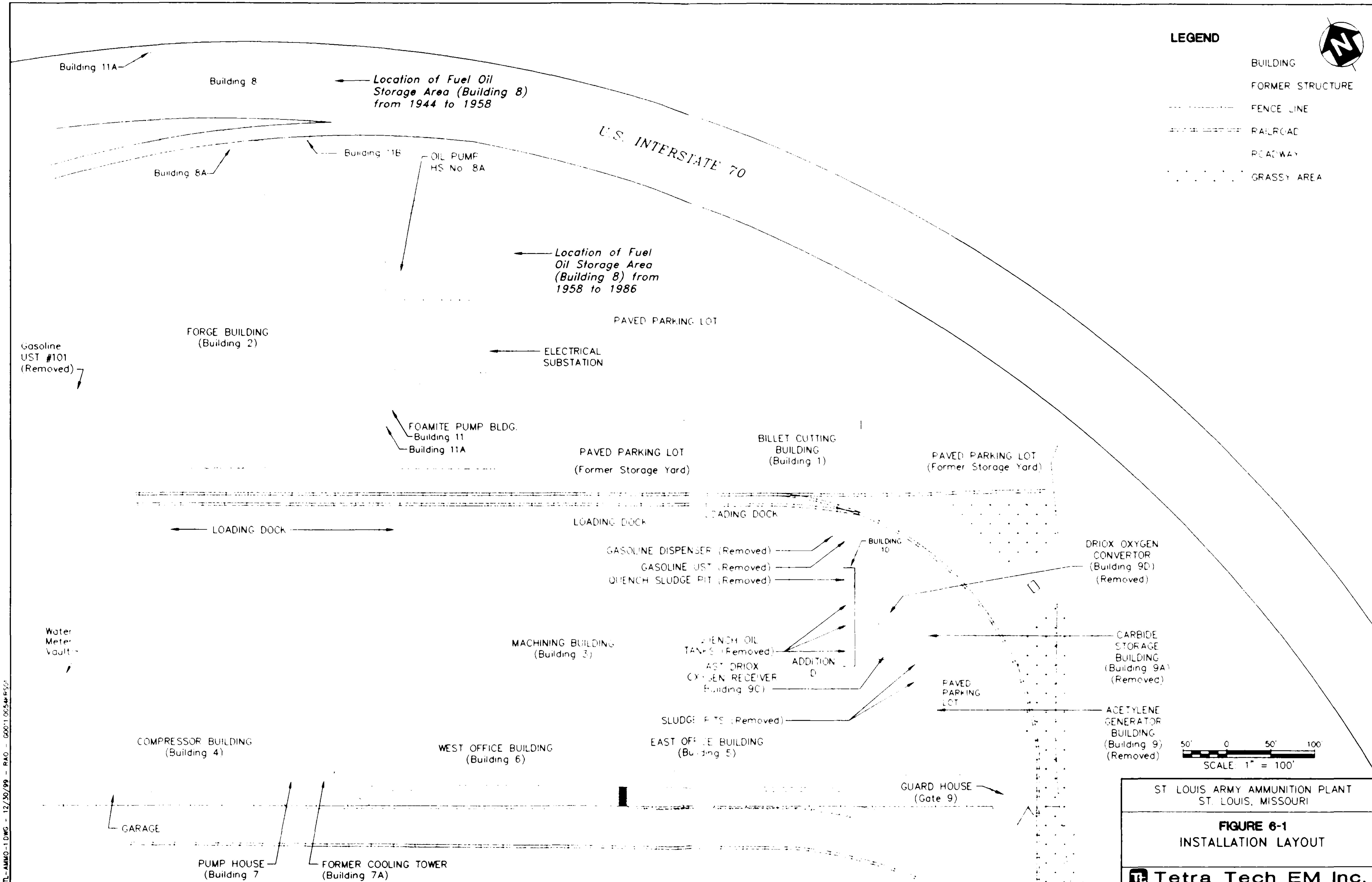
6.2.1 Results of Post-1941 Aerial Photograph Review

Aerial photographs of the SLAAP property taken in 1958, 1965, 1971, 1986, and 1991 were reviewed. The results of the aerial photograph review are summarized below. The aerial photographs depict the historical evolution of the SLAAP property. They do not appear to indicate that solid waste or hazardous material storage other than that identified in historical documents took place on the SLAAP property. Aerial photographs are contained in Appendix D.

1958 Aerial Photograph

An aerial photograph taken in May 58 was reviewed at a scale of 1 inch to 750 feet. The aerial photograph reveals the following:

- I-70 had been constructed; however, the exit and entrance ramps were apparently still under construction.
- The heating oil tanks (Building 8) were present east of Building 2. The electrical substation was not present.
- The parking lots west and east of Building 1 were not present, and the areas of these lots were being used for billets storage.
- The garage at the southwest corner of Building 4 had not been constructed, but the cooling tower was in operation.
- The areas north of Building 1 and east of Building 2 were apparently covered with grass.
- Cooling towers and chimneys were present on the roof of Building 3.
- A structure was present between Buildings 3 and 1.
- The guardhouse at Gate 9 was not present.



ST LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 6-1
INSTALLATION LAYOUT

Tetra Tech EM Inc.

- The properties lying across I-70 were apparently residential in nature.
- The property on the southwest corner of the intersection of Amelia Avenue and Goodfellow Boulevard was apparently a gasoline station.
- No chemical storage areas were apparently present.

1965 Aerial Photograph

An aerial photograph taken in Oct 65 was reviewed at a scale of 1 inch to 750 feet. This aerial photograph is identical to the 1958 aerial photograph with one exception: the property on the southeast corner of the intersection of Goodfellow Boulevard and the eastbound I-70 exit ramp was apparently a gasoline station.

1971 Aerial Photograph

An aerial photograph taken in May 71 was reviewed at a scale of 1 inch to 750 feet. This aerial photograph is identical to the 1965 aerial photograph with the following exception: the area north of Building 1 and east of Building 2 was a paved parking lot.

1986 Aerial Photograph

An aerial photograph taken in Jun 86 was reviewed at a scale of 1 inch to 750 feet. This aerial photograph is identical to the 1971 aerial photograph with the following exceptions:

- The Acetylene Generation Area (Buildings 9 and 9A through 9D) had been removed.
- The garage southwest of Building 4 was present.

1991 Aerial Photograph

An aerial photograph taken in Mar 91 was reviewed at a scale of 1 inch equal to 750 feet. This aerial photograph is identical to the 1986 aerial photograph with the following exceptions:

- The billet storage areas east and west of Building 1 had been paved and converted into parking lots.
- The equipment on the roof of Building 3 had been removed.

- The structure between Buildings 1 and 3 had been removed.

- The heating oil tanks located east of Building 2 had been removed.

- An electrical substation had been constructed east of Building 2 in the south portion of the former heating oil tank area.

- The Gate 9 guardhouse was present.

6.2.2 Interviews

Attempts were made to contact personnel present during SLAAP operations. As of the time this report was completed, personnel present during SLAAP manufacturing operations could not be identified. If such personnel are identified at a later date, additional information pertaining to SLAAP operations will be submitted as an addendum to this report. One person interviewed was Jim Kuenhle, executive assistant to the Commander at Charles Melvin Price Support Center. Mr. Kuenhle was the environmental coordinator at SLAAP from the late 1980s through 1997. Information obtained from Mr. Kuenhle has been incorporated into this report.

6.2.3 Results of Post-1941 Historical Review

Records pertaining to uses of the property after 1941 were reviewed. These records included the Survey and Inventory of Class A Property (COE 1945), a summary of 105 mm shell production available at the Charles Melvin Price Support Center (Ordnance Department undated), Industrial Facilities Inventory (SLAAP undated), aerial photographs, visual observations during the site visit, and other documents listed in Section 9.0. The information gathered from the records was used to identify possible areas of environmental concern in each of the buildings on the property. Because SLAAP consists primarily of structures, the results of the post-1941 historical review are presented on a building-by-building basis in the following summary tables. Refer to Figure 6-1 for the locations of buildings at SLAAP.

BUILDING 1: BILLET CUTTING BUILDING	
Building Characteristics	
Area	8,770 square feet
Style	One story
Construction Materials	Building 1 is a steel framework and roof truss building with corrugated asbestos siding. The floor is reinforced concrete. The roof is precast concrete slab deck with a pitch felt and gravel surface.
Construction Date	Summer 1944
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	Long, steel billets or bars were cut into prescribed lengths using a nick and break method. Billets were nicked by acetylene torches. Hydraulic systems were employed in the break operation. Spray and quench operations using water for cooling were also performed in Building 1. The steel billets were stored in concrete and H-beam racks east and west of the ends of the building. After inspection, the billets were trucked to Building 2.
Process Machinery	Process machinery included billet nicking machines, grinders, a conveyer, hydraulic break machines, a saw sharpener, dust collectors, exhaust fans, self-propelled electric cranes, unit ventilators, pits under hydraulic break machines, a pit with process water discharge, and a pit with an acetylene drip pot.
Process Utilities	Process utilities included water, steam, compressed air, acetylene gas, oxygen gas, and electricity.
Hazardous Material Information	
Possible Hazardous Materials Used	Acetylene, quench water, cooling oil, hydraulic oil, machine lubricants, and degreasers
Hazardous Material Storage and Usage Areas	Pits under hydraulic break machines, a pit with process water discharge, and a pit with an acetylene drip pot
Hazardous Material Off-Loading Areas	Pits under hydraulic break machines, a pit with an acetylene drip pot and the connector sewer, and a pit with process water discharges to the sewer

BUILDING 2: FORGE BUILDING	
Building Characteristics	
Area	First Floor: 73,095 square feet Second Floor (Switching Room): 792 square feet Third Floor (Machine Balconies): 2,964 square feet Fourth Floor (Catwalks): 1,803 square feet Fifth Floor (Locker Rooms): 1,701 square feet
Style	Five stories
Construction Materials	Building 2 has a steel frame and roof trusses on reinforced concrete piers; corrugated asbestos siding; and an asbestos-covered, metal roof.
Construction Date	1944
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	From 1944 to 1969, Building 2 was used for 105mm howitzer shell production. The building contained 10 gas- and oil-fired rotary furnaces used for slug heating and forging. Cut steel billets from Building 1 were forged into a cylindrical shape. After forging, the billets were cooled in spray and quench operations that used water. Also, various hydraulic systems were used in the production process.
Process Machinery	Process machinery included rotary furnaces, piercing presses, sizing and descaling units, hydraulic draw benches, conveyors, accumulators, air hammers, cooling tanks, oil heaters, cranes, metal grinders, transformers, and air compressor motors and cylinders.
Utility Lines	Process utilities included electricity, water, fuel oil, compressed air, steam, and natural gas.
Hazardous Material Information	
Possible Hazardous Materials Used	Hydraulic and fuel oils, solvents (toluene), asbestos, LBP, quench water, and machine lubricant oils.
Hazardous Material Storage and Usage Areas	First Floor: A fuel oil distribution system, hydraulic oil systems, and cooling tanks Second Floor: Two transformers and switches Outside: An 11,500-gallon regular (leaded) gasoline UST and dispenser (abandoned and filled with sand in 1959, removed in 1992)
Hazardous Material Off-Loading Areas	The UST was filled using a fill port on top of the tank. Fuel oil was off-loaded into pipes contained in loading pits. These pits were located north of Building 2 from 1944 to 1958 and east of the building from 1958 to 1969.

BUILDING 3: MACHINING BUILDING	
Building Characteristics	
Area	Basement: 37,000 square feet First Floor: 168,000 square feet Second Floor: 154,780 square feet Penthouse: 6,813 square feet
Style	Two stories with basement and two penthouses
Construction Materials	Building 3 has a steel frame and roof beams on reinforced concrete piers and spread footings; masonry walls; and a prefabricated, concrete roof. The east-side addition has the same structure but also has asbestos siding.
Construction Date	Built in 1941, retooled (including east-side addition) in 1944, renovated 1984 and 1985 to create office space
Historical Use	
Occupants/Lessees	1941 to 1944: SLOP (0.30-caliber munition production) 1944 to 1983: SLAAP (105mm howitzer shell production) 1985 to 1996: AVSCOM (office space)
Operational Periods	1941 to 1944: 0.30-caliber munition production 1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production 1985 to 1996: Office space
Historical Process	
Process Description	From 1941 to 1944, Building 3 was used for the manufacture of 0.30-caliber ammunition. In 1944, the building was converted into the Machining Building for 105mm howitzer shell production. Processes completed in Building 3 consisted of shell shaping, heat treating, cleaning, painting, and packaging for shipment. Metal chips and fragments produced as a result of the shell machining process were collected on the first and second floors and disposed of in the chip chute. The chip chute is an open chute along the north wall of Building 3 which opened to the basement. Metal chips and fragments, along with soluble oil, were collected in the basement of Building 3. From the basement of Building 3, the metal chips were transferred to railcar by a conveyor for off-site disposal.
Process Machinery	Process machinery included lathes, drill presses, milling machines, grinders, heat treating furnaces, wash racks, welders, shapers, shot blasting equipment, paint spray booths, transformers, air compressors, and auxiliary equipment (dust collection devices, elevators, conveyors, and elevators).
Process Utilities	Process utilities included water, steam, compressed air, soluble oil, quench oil, paint, natural gas, telephone service, and electricity.

BUILDING 3: MACHINING BUILDING (Continued)	
Hazardous Material Information	
Possible Hazardous Materials Used	Cutting (soluble) oil, quench oil (No. 6 fuel oil), hydraulic oil, solvents (toluene), asbestos, LBP, and pesticides
Hazardous Material Storage and Usage Areas	Basement: Chip chute 6-inch-diameter quench oil lines to sludge tank Transformer vaults Quench oil pump room First Floor: Cutting (soluble) oil distribution system Soluble oil and mixing room 14 quench oil tanks and associated pump rooms Paint storage room (including tanks and drums) Hydraulic oil reclamation room Five wash racks Five paint spray booths Paint stripping room Grease pit Second Floor: Cutting oil distribution system Heat treating quench oil
Hazardous Material Off-Loading Areas	The quench oil USTs at Building 8 had remote fill capability from railroad tracks on the northeast side of Building 3.

BUILDING 4: AIR-COMPRESSOR BUILDING	
Building Characteristics	
Area	Basement: 2,772 square feet First Floor: 8,450 square feet
Style	One story with basement
Construction Materials	Building 4 has a steel frame and roof beams on reinforced concrete piers and spread footings and has corrugated asbestos siding and roofing.
Construction Date	1944
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	From 1944 to 1969, Building 4 housed a series of air compressors used to generate compressed air for processes performed in other SLAAP buildings.
Process Machinery	Process machinery included compressor motors and cylinders, intercoolers, aftercoolers, and cyclone separators.
Process Utilities	Process utilities included electricity, water, compressed air, and steam.
Hazardous Material Information	
Possible Hazardous Materials Used	Asbestos, LBP, and hydraulic and motor oils
Hazardous Material Storage and Usage Areas	Outside: Two transformers
Hazardous Material Off-Loading Areas	None

BUILDING 5: HEADQUARTERS AND OFFICE BUILDING	
Building Characteristics	
Area	Basement: 1,153 square feet First Floor: 11,662 square feet Second Floor: 10,075 square feet Penthouse: 392 square feet
Style	Two stories with basement and penthouse
Construction Materials	Building 5 has a steel framework on reinforced concrete (brick-covered) walls and piers with spread footings. The floors are reinforced concrete. Some corrugated asbestos siding was used in the walls. The building has a precast concrete roof with insulation board underneath.
Construction Date	Built in 1941, alterations made in 1944 to convert the building into office space, renovated and upgraded in 1984 to provide office space
Historical Use	
Occupants/Lessees	1941 to 1944: SLOP (Primer building) 1944 to 1983: SLAAP (office space) 1962 to 1967: Futura Manufacturing Company (assembly of pocket-sized radios) 1985 to 1996: AVSCOM (office space)
Operational Periods	1941 to 1944: Primer loading 1944 to 1945: Office space 1952 to 1954: Office space 1962 to 1967: Assembly of pocket-sized radios 1966 to 1969: Office space 1985 to 1996: Office space
Historical Process	
Process Description	Building 5 was used as a primer loading plant for 0.30-caliber ammunition from 1941 until 1944. Small arms ammunition loading machinery was then removed, and the building was converted into an administrative office building. This building was also leased from 1962 to 1967 to the Futura Manufacturing Company for assembly of pocket-sized radios.
Process Machinery	Process machinery included small arms ammunition loading machinery until 1944, an elevator, and steam unit heaters.
Process Utilities	Process utilities included water, steam, telephone service, and electricity.
Hazardous Material Information	
Possible Hazardous Materials Used	Hydraulic oil, asbestos, LBP, cleaners, transformer oil, and ballasts
Hazardous Material Storage and Usage Areas	Transformers, ballasts, and oil storage house outside
Hazardous Material Off-Loading Areas	None

BUILDING 6: WEST OFFICE AND LABORATORY BUILDING	
Building Characteristics	
Area	Basement: 1,153 square feet First Floor: 9,825 square feet Second Floor: 10,477 square feet Penthouse: 118 square feet
Style	Two stories with basement and penthouse
Construction Materials	Building 6 has a steel framework on reinforced concrete (brick-covered) walls and piers with spread footings. Some corrugated asbestos siding was used on the walls. The floors are reinforced concrete. The building has a concrete slab roof with insulation board underneath.
Construction Date	Built in 1941, alterations made in 1944 to convert the building into office space
Historical Use	
Occupants/Leases	1941 to 1944: SLOP (small arms primer insert building) 1944 to 1983: SLAAP (office space and laboratory) 1985 to 1996: AVSCOM (office space)
Operational Periods	1941 to 1944: Small arms primer insertion 1944 to 1945: Office and laboratory space 1952 to 1954: Office and laboratory space 1966 to 1969: Office and laboratory space 1985 to 1996: Office space
Historical Process	
Process Description	Building 6 was used for small arms primer insertion from 1941 until 1944. The primer insertion machinery was removed and the building was converted into office space in 1944. A metallurgical laboratory occupied a small part of the first floor and performed quality control testing. Building operations included polishing, measuring, and some etching.
Process Machinery	Process machinery included small arms primer insertion machinery, ventilators for the laboratory, radiators, and steam unit heaters.
Process Utilities	Process utilities included water, steam, telephone service, and electricity.
Hazardous Material Information	
Possible Hazardous Materials Used	Small amounts of unidentified laboratory chemicals and solvents as well as hydraulic oil, asbestos, LBP, cleaners, transformer oil, and ballasts
Hazardous Material Storage and Usage Areas	Transformers, ballasts, and the laboratory
Hazardous Material Off-Loading Areas	None

BUILDING 7: WATER PUMP HOUSE	
Building Characteristics	
Area	1,048 square feet
Style	One story
Construction Materials	Building 7 has concrete block walls, a reinforced concrete floor with a reinforced concrete slab, and a tar and gravel roof.
Construction Date	1944
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	From 1944 to 1969, Building 7 housed several water pumps used to circulate process (coolant) water between Buildings 2 and 4 and a cooling tower (Building 7A) adjacent to Building 7.
Process Machinery	Water pumps were the only process machinery.
Process Utilities	Process utilities included electricity, water, steam, and compressed air.
Hazardous Material Information	
Possible Hazardous Materials Used	Asbestos and LBP
Hazardous Material Storage and Usage Areas	None
Hazardous Material Off-Loading Areas	None

BUILDING 7A: COOLING TOWER	
Building Characteristics	
Area	635 square feet
Style	15-foot-tall cooling tower
Construction Materials	Building 7A is a wooden frame tower on a concrete base.
Construction Date	1944
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	From 1944 to 1969, Building 7A was a cooling tower. Process water used as coolant in Buildings 2 and 4 was pumped to this tower by pumps housed in Building 7 and was recirculated after cooling.
Process Machinery	Piping was the only process machinery.
Process Utilities	Process utilities included water, steam, and compressed air.
Hazardous Material Information	
Possible Hazardous Materials Used	None
Hazardous Material Storage and Usage Areas	None
Hazardous Material Off-Loading Areas	None

BUILDING 8: FUEL STORAGE AREA	
Building Characteristics	
Area	25,480 square feet
Style	A square area bounded by earthen dams on three sides and a natural slope on the fourth; area was divided into three equal sections by walls
Construction Materials	Building 8 had concrete block walls and earthen dams.
Construction Date	1944
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	From 1944 to 1969, Building 8 was used to store fuel oil used by the rotary furnaces and other process machinery in Building 2. The fuel was pumped from the storage tanks in Building 8 through pipelines by pumps located in Building 8A. The pipelines entered the north side of Building 2 beneath the ground floor level. From 1944 to 1958, Building 8 was located north of Building 2. In 1958, Building 8 was relocated to the east side of Building 2 in order to make way for I-70 construction. Piping at the north end of Building 2 was extended east and south in 1958 to allow transfer of oil from the new Building 8 location. The storage tanks were removed and donated to the Missouri Department of Transportation in 1986.
Process Machinery	Process machinery included aboveground storage tanks and piping.
Process Utilities	Process utilities included electricity, foamite fire retardant, fuel oil, and steam.
Hazardous Material Information	
Possible Hazardous Materials Used	Fuel oil
Hazardous Material Storage and Usage Areas	Fuel oil stored in nine 16,000- to 19,000-gallon aboveground storage tanks Oil drain sump used to temporarily store "dirty" return oil from Building 8A oil pumps
Hazardous Material Off-Loading Areas	From 1944 to 1958, oil was off-loaded from trucks into pipes in two loading pits located south of Building 8 at the top of the natural slope. The exact location of Building 8 from 1958 to 1969 is not known, but it was likely east of Building 2.

BUILDING 8A: OIL PUMP HOUSE	
Building Characteristics	
Area	813 square feet
Style	One story
Construction Materials	Building 8A has concrete block walls, a reinforced concrete slab floor, and a tar and gravel roof.
Construction Date	1944
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	From 1944 to 1969, Building 8A housed pumps used to transfer oil from Building 8 to the oil-fired furnaces and process machinery in Building 2. The oil was transferred via pipes that began at each of the oil storage tanks in Building 8, connected to the pumps in Building 8A, and entered the north side of Building 2 through a concrete-lined tunnel under the road between Building 8A and Building 2. The location of Building 8A was shifted from the north side to the east side of Building 2 when Building 8 was relocated to make way for I-70 construction in 1958.
Process Machinery	Process machinery included oil pumps and oil heaters.
Process Utilities	Process utilities included electricity, water, fuel oil, foamite fire retardant, compressed air, and steam.
Hazardous Material Information	
Possible Hazardous Materials Used	Fuel oil, asbestos, LBP
Hazardous Material Storage and Usage Areas	Fuel oil in pumps and piping
Hazardous Material Off-Loading Areas	None

BUILDINGS 9 AND 9A THROUGH 9D: ACETYLENE GENERATION AREA	
The Acetylene Generation Area consisted of the Acetylene Generator Building (Building 9), the Carbide Storage Building (Building 9A), the Sludge Pits (Building 9B), the Oxygen Receiver (Building 9C), and the Driox Oxygen Convertor (Building 9D). The Oxygen Receiver (Building 9C) was an aboveground storage tank owned by a gas supplier.	
Building Characteristics	
Area	Building 9: 1,228 square feet Building 9A: 2,061 square feet Building 9B: 378 square feet Building 9C: Not applicable Building 9D: 455 square feet
Style	Building 9: Single story Building 9A: Single story Building 9B: Sludge pit Building 9C: Aboveground storage tank Building 9D: Single story
Construction Materials	Building 9: Wooden frame, rafters, and roof; tile walls; and a concrete floor Building 9A: Reinforced concrete walls, wooden rafters and decking, and a concrete floor Building 9B: Reinforced concrete Building 9C: Steel with reinforced concrete support Building 9D: Concrete walls, wooden rafters and roof decking, and a concrete floor
Construction Date	Built in 1941 and used for transfer of bulk powder into cans, modified in 1944. In the early 1980s, the Acetylene Generator Building, Sludge Pits, and Oxygen Receiver were removed.
Historical Use	
Occupants/Lessees	1944 to 1983: SLAAP (105mm howitzer shell production)
Operational Periods	1941 to 1944: Smokeless powder canning 1944 to 1945: 105mm howitzer shell production 1952 to 1954: 105mm howitzer shell production 1966 to 1969: 105mm howitzer shell production
Historical Process	
Process Description	During shell production operations, the Acetylene Generation Area supported acetylene production for SLAAP. According to historical records, acetylene was generated by mixing calcium carbide and water. The reaction was contained in four acetylene generators in Building 9. Acetylene was then distributed via underground piping to Buildings 2 and 3. Acetylene was produced by reacting calcium carbide with water. A byproduct of this reaction is a calcium hydroxide slurry. The hydroxide slurry was a caustic material that was stored in two sludge pits located in Building 9 until transported off site by contractors.

BUILDINGS 9 AND 9A THROUGH 9D: ACETYLENE GENERATION AREA (Continued)	
Process Machinery	Process machinery included acetylene generators, pumps, a cold oxygen convertor, and piping.
Process Utilities	Process utilities included acetylene, water, compressed air, and electricity.
Hazardous Material Information	
Possible Hazardous Materials Used	Smokeless powder, calcium carbide (based on reactivity and flammability), machining cooling oil, sludges, asbestos, and LBP
Hazardous Material Storage and Usage Areas	Building 9: Smokeless powder drip pots under acetylene generators Building 9A: Storehouse for calcium carbide Building 9B: Sludge pits with a sewer outfall Building 9C: Aboveground storage tank for oxygen Building 9D: Cold oxygen convertor
Hazardous Material Off-Loading Areas	Sludges were pumped into trucks via piping system installed on the north side of the Sludge Pits. The Sludge Pits were connected to the sewer system by underground piping.

BUILDING 10: QUENCH OIL STORAGE TANKS	
Building Characteristics	
Area	Building 10 consisted of three cylindrical, steel USTs and one rectangular, concrete UST. These tanks were located at the east outside end of Building 3 and were aligned in the north-south direction. The approximate dimensions of the area covered by the USTs are 30 by 100 feet The tanks had the following dimensions: Tank No. — Dimensions — Capacity (gallons) 87 — 10 feet, 0 inch by 24 feet, 0 inch — 14,100 17 — 10 feet, 6 inches by 23 feet, 6 inches — 15,222 15 — 10 feet, 6 inches by 23 feet, 8 inches — 15, 332 Sludge pit — 11 feet wide by 18 feet long by 13 feet deep — 17,000
Style	Three of the USTs were cylindrical, horizontal, steel tanks with flat ends, each lying on three 18-inch saddles resting on a reinforced, 12-inch, concrete foundation. A 7/8-inch-diameter rod with a turnbuckle was installed on each saddle for fastening the tank to the concrete foundation. The quench oil sludge pit was a reinforced concrete structure.
Construction Materials	Tanks 15, 17 and 87 were made of steel. The quench oil sludge pit was made of reinforced concrete.
Construction Date	The USTs appeared in drawings dated as early as 1944 and were built during construction of the Building 3 east-end addition in 1944.
Historical Use	
Occupants/Lessees	1941 to 1944: SLOP 1944 to 1983: SLAAP 1985 to 1996: AVSCOM
Operational Periods	1944 to 1945: Operational for 105mm howitzer shell production 1952 to 1954: Operational for 105mm howitzer shell production; production terminated in May 54 1966 to 1969: Operational for 105mm howitzer shell production 1993: UST removal activities were initiated in Jan 93. The USTs were removed during the week ending 30 Jan 93. The area where the USTs were was backfilled during the end of Jul and beginning of Aug 93.

BUILDING 10: QUENCH OIL TANKS (Continued)	
Historical Process	
Process Description	The three quench oil USTs and the sludge pit were located outdoors in front of the east end of Building 3 and were used to supply cooling oil (No. 6 Bunker fuel oil) to 14 quench oil tanks on the first floor of the east section of Building 3.
Process Machinery	Process machinery included quench oil USTs and a sludge pit.
Process Utilities	Process utilities included electricity, lubricating oils, compressed air, steam, and water.
Hazardous Material Information	
Possible Hazardous Materials Used	Quench oil, hydraulic oil, solvents (toluene), and heavy metals
Hazardous Material Storage and Usage Areas	Underground: The quench oil USTs were connected to 4-inch-diameter supply and return lines from the quench oil pumping room in Building 3. The Building 3 first-floor spillage from the areas near the 14 indoor quench oil tanks drained to the quench oil sludge pit UST via a 6-inch-diameter gravity line. A second 6-inch-diameter gravity line was connected to the 14 indoor quench oil tank drain lines. The sludge pit clear oil return pumping system is located next to the middle section of the east basement wall of Building 3. First Floor: Quench oil transfer pumps and quench oil tanks in oil distribution system Second Floor: 14 hardening furnaces used quench oil as cooling media Roof: 14 evaporative cooling systems cooled quench oil before being returned to the quench oil system
Hazardous Material Off-Loading Areas	The quench oil USTs were filled using fill ports on top of the tanks. The quench oil system had a remote 4-inch-diameter fill line capability from railroad tracks on the northeast side of Building 3.

BUILDING 11: FOAMITE GENERATOR BUILDING	
Building Characteristics	
Area	The original building covered 274 square feet. The current building is of approximately the same dimensions and incorporates a hose cart shelter.
Style	One-story, concrete block building on a concrete slab
Construction Materials	The original Building 11 had concrete block walls resting on reinforced concrete foundation and had a wooden roof. The building had a glass window with a steel frame and hinged sections in the top section of the window to allow air ventilation. The building had a reinforced concrete floor with a 2- by 3-foot concrete drain pit. The existing building is similar to the original one except that the building also houses the foamite hose cart shelter.
Construction Date	The original building was constructed in 1944. The current building was built in late 1957 or early 1958 during the relocation of Building 8.
Historical Use	
Occupants/Lessees	1944 to 1958: SLAAP 1958 to 1983: SLAAP 1985 to 1996: AVSCOM
Operational Periods	1944 to 1945: Operational for 105mm howitzer shell production 1945 to 1952: System could have been operational for fire protection purposes 1952 to 1954: Operational for 105mm howitzer shell production 1954 to 1958: System could have been operational for fire protection purposes 1958: The building was demolished during the relocation of Building 8. A new Building 11 was built on the west side of Building 2, across the roadway. 1958 to 1966: System could have been operational for fire protection purposes 1966 to 1969: Operational for 105mm howitzer shell production

BUILDING 11: FOAMITE GENERATOR BUILDING (Continued)	
Historical Process	
Process Description	Building 11 housed the foamite generator system. The original system included a 15-horsepower pump system, a foamite generator, and a 4-inch-diameter foamite line that left the south corner of the building and split into two main lines. Foamite was a foam used to extinguishing fires and was made by mechanical agitation of a protein-based (normally hydrolysate) surfactant water, and minor amounts of ferric hydroxide used as foam stabilizer. Typically, generation of foamite involved the addition of dry foamite powder to the pressurized water via an eduction system. The foamite would then be introduced to the distribution system. The first 4-inch-diameter line of the distribution system ran parallel to the northeast side of Building 2 across the roadway and contained two hydrants. The hydrants were located south and west of Building 8A. The second 4-inch-diameter foamite line ran along the outer northwest and northeast banks of the earthen dike. This line contained two hydrants, one north of oil tank 24 and one east of oil tank 20. For localized oil tank fires, independent, 3-inch-diameter lines were connected to each oil tank. Each of these lines was equipped with gate valves for isolation purposes and ended with a foamite delivery nozzle on top of each oil tank.
Process Machinery	Process machinery included a foamite generator, a 15-horsepower motor and pump with switch disconnect, and the foamite distribution line.
Process Utilities	Process utilities included water, the foamite line, steam, electricity, and a sewer drain.
Hazardous Material Information	
Possible Hazardous Materials Used	None
Hazardous Material Storage and Usage Areas	None
Hazardous Material Off-Loading Areas	None

BUILDINGS 11A AND 11B: HOSE CART SHELTERS	
Building Characteristics	
Area	Building 11A: 98 square feet Building 11B: 98 square feet
Style	Each building was a one-story, concrete block building. Building 11A was located in the northwest corner of the area enclosed by the earthen dike around Building 8, and Building 11B was located west of Building 11 across the roadway from the northwest corner of Building 2.
Construction Materials	Each building had concrete block walls resting on reinforced concrete foundation walls, a wooden roof, and a reinforced concrete floor.
Construction Date	The original Buildings 11A and 11B were built in 1944. The existing Building 11A is an annex to the existing Building 11.
Historical Use	
Occupants/Lessees	1944 to 1958: SLAAP 1958 to 1983: SLAAP 1985 to 1996: AVSCOM
Operational Periods	1944 to 1945: Operational for 105mm howitzer shell production 1945 to 1952: System could have been operational for fire protection purposes 1952 to 1954: Operational for 105mm howitzer shell production 1954 to 1958: System could have been operational for fire protection purposes 1958: Buildings 11A and 11B were demolished during the relocation of Building 8. A new Building 11A was built adjacent to the existing Building 11. 1958 to 1966: System could have been operational for fire protection purposes. 1966 to 1969: Operational for 105mm howitzer shell production
Historical Process	
Process Description	The original Buildings 11A and 11B each housed one hose cart for the foamite generator system hydrants. The existing Building 11 was built to house one of the hose carts.
Process Machinery	Flexible hoses and hose carts were the only process machinery.
Process Utilities	None
Hazardous Material Information	
Possible Hazardous Materials Used	None
Hazardous Material Storage and Usage Areas	None
Hazardous Material Off-Loading Areas	None

7.0 ADJACENT PROPERTY USES

This section describes the uses of the properties adjacent to SLAAP. Section 7.1 describes the historical uses of the properties adjacent to SLAAP, and Section 7.2 describes their current uses.

7.1 HISTORICAL USES

In the past, properties surrounding and adjacent to SLAAP were used for residential, commercial, and industrial purposes. From 1944 to 1958, adjacent properties north, northeast, and east of SLAAP were entirely residential and SLOP was industrial. However, in 1958, the land north, northeast, northwest, and east of SLAAP and a portion of the installation itself were purchased by the State of Missouri for construction of I-70 and the Goodfellow Boulevard entrance and exit ramps. The portion of the SLAAP property purchased included the original location of the Fuel Oil Storage Area (Buildings 8 and 8A) (see Figure 6-1).

The property south of SLAAP was used by SLOP. A portion of the SLOP site is currently occupied by the PURO facility. The facility manufactured many types of ammunition ranging from small arms rounds to artillery shells. The northeast portion of SLOP where artillery shells were manufactured became known as SLAAP in 1945.

The properties west and northwest of SLAAP were originally residential, but portions of these properties were eventually developed for light commercial use and highway construction. At the time of SLAAP's construction, the properties to the west and northwest were entirely residential. By 1958, a service station had been constructed on the southwest corner of the Goodfellow Boulevard and Amelia Avenue intersection. By 1965, a second service station was in use on the southwest corner of the Goodfellow Boulevard and I-70 eastbound exit ramp intersection.

7.2 CURRENT USES

Currently, the properties surrounding and adjacent to SLAAP are used for residential, industrial, and light commercial purposes. The property north of SLAAP contains I-70 and the Goodfellow Boulevard exit ramps, and residential developments lie to the north across I-70. The properties east of SLAAP include I-70, a grassy field adjacent to the highway used by the Missouri Department of Transportation for outdoor storage of vehicles and construction supplies, and a parking lot used for storage of semi trucks and trailers.

The portion of the SLOP property immediately south of SLAAP is now occupied by the PURO facility at 4700 Goodfellow Boulevard, which is used to store chemical products. The properties west of SLAAP are still primarily residential, but some commercial developments are present. The commercial developments include two service stations, a Shell station at 4903 Goodfellow Boulevard and a Sunoco station at 5003 Goodfellow Boulevard, and a combination carwash and barber shop on the corner of the intersection of Goodfellow Boulevard and the I-70 eastbound exit ramp. The PURO facility and carwash, which may be a former gasoline station, properties may be of environmental concern to SLAAP.

8.0 SITE INSPECTION SUMMARY

A site inspection was conducted at SLAAP on 22 and 23 Feb 99. This section summarizes general site inspection observations made at SLAAP. Sections 8.1 through 8.12 summarize sitewide and building-specific observations. The entire SLAAP site was photodocumented. However, in this report, only photographs pertinent to possible areas of environmental concern are included. The complete photodocumentation will be submitted to AMCOM under separate cover. The photographic log for this report is presented in Appendix E.

SLAAP is currently vacant and is located in a residential and light industrial area. Utilities are not in service at the installation except for the water in the fire hydrant system. A large electrical substation is located east of Building 2 (see Figure 6-1). Storm water runoff from the property is captured by storm sewers connected to the City of St. Louis storm sewer system. The remaining buildings on the property were found to be in relatively good condition. Buildings 1, 2, 3, and 4 were found to have panels that may contain ACM. Because of the age of the various buildings, LBP is expected to be found throughout them. Unless otherwise noted below and in Sections 8.1 through 8.12, surface staining and other surface contamination were not observed.

SUMMARY OF GENERAL SITE INSPECTION OBSERVATIONS FOR SLAAP		
Location	**Pertinent Observations**	**Photograph Number**
Southeast Area	The SLAAP entrance (Gate 9) and guardhouse were located at the southeast corner of the property. PURO (see left hand-side of Photograph No. Sitewide-1) occupies the property immediately south of SLAAP.	Sitewide-1
	On the Gate 9 entrance road (about 10 feet north of the gate and 5 feet east of the red automatic gate mechanism), an unidentified, 3- to 4-inch-diameter, metallic pipe cover was observed (next to the standing water) in the middle of a square, asphalt patch.	Sitewide-2
	A concrete pad was observed in a grassy area (in the center of the photograph) southwest of the property's southeast entrance. A guardhouse, formerly Building 236C, was at this location.	Sitewide-3
East Area	The SLAAP property is bounded by Riverview Avenue on the east. The property across Riverview Avenue is an empty lot used for semi-trailer parking. A water shutoff valve box is located several feet west of SLAAP's east fence about midway between Gate 9 and the northeast guardhouse.	Sitewide-4, Sitewide-5

SUMMARY OF GENERAL SITE INSPECTION OBSERVATIONS FOR SLAAP		
Location	**Pertinent Observations**	**Photograph Number**
East Area (Continued)	The east area parking lot was inspected for surface contamination. This location formerly contained Buildings 9 and 9A through 9D. Dumpsters were observed on the north side of the parking lot. No contamination was apparent.	9-1
	The east guardhouse was boarded up, and the vehicle entrance was locked.	Sitewide-6
	The grassy areas east and northeast of Building 3 were inspected. No surface contamination was apparent. A concrete pad with a permanent surveying benchmark was located just north of a wooden pole (see Photographs No. Sitewide-7 and Sitewide-8). This foundation pad was similar to one located southwest of SLAAP's southeast entrance. The rectangular, concrete foundation pads were parts of the train track foundation support system.	Sitewide-7, Sitewide-8, 1-1, 3-62
	The roadway and train track area between Buildings 3 and 1 was inspected. The distinct differences in the color of the various concrete and asphalt surfaces on the roadway were attributed to different concrete and asphalt compositions used during various repair projects that had taken place at different times. No surface contamination was evident in this area.	1-1, 1-2, 1-5, 1-6, 3-62
	The east part of the northeast parking lot located east of Building 1 did not display any apparent surface contamination. This location was formerly the billet storage yard.	Sitewide-9, Sitewide-10, 1-5
	Street sewer repairs were taking place on the west side of Riverview Avenue just below the west side of the I-70 bridge. The excavated soil along the trench made for the sewer repair was uniform in color. No evidence of contamination was observed in the exposed soil.	Sitewide-11
	East and northeast of Building 3, rust stains were observed in the area where the chip chute containers were kept (see the center of Photograph No. Sitewide-12). The area where gasoline tank 105; the sludge pit; and quench oil USTs 15, 17, and 87 were formerly located (see the middle of the right side of Photograph No. Sitewide-12) was inspected. This area extended about 3 to 20 feet east of the east wall of Building 3 and between the southeast corner (immediately north of the Building 3 southeast overhead entrance door) and northeast corner of Building 3. The top fill in this area was similar to aggregate CA-7 or smaller. Other than the rust stains discussed above, no surface contamination was observed east or northeast of Building 3.	Sitewide-12

SUMMARY OF GENERAL SITE INSPECTION OBSERVATIONS FOR SLAAP		
Location	**Pertinent Observations**	**Photograph Number**
West Area (Continued)	The roadway between Buildings 2 and 3 was inspected. No surface contamination was observed in this area.	2-25, 3-60
	The area west of Building 3 and the roadway running between Buildings 3 and 4, Buildings 3 and 7, Buildings 3 and 5, and Buildings 3 and 6 were inspected. No evidence of surface contamination was observed at these locations.	3-61, 3-62, 3-63, 4-5, 5-1, 5-3, 6-2.
	The southwest portion of the SLAAP property contained a locked vehicle entrance gate and a former garage (Building 13) just southwest of Building 4. No surface contamination was observed in this area.	Sitewide-21, Sitewide-25
	The area west of the SLAAP property across Goodfellow Boulevard contained residences and small businesses, including a grocery store, carwash, and barber shop. A Shell gasoline service station was located north-northwest of SLAAP across Goodfellow Boulevard and I-70.	Sitewide-22, Sitewide-23, Sitewide-24, Sitewide-27, Sitewide-28
South Area	The PURO facility occupies the property along SLAAP's south boundary. The facility also bears the name of Contico as shown in Photograph No. Sitewide-19.	Sitewide-1, Sitewide-19, Sitewide-21, Sitewide-25, 7-1, 7A-1, 7A-2
	The area between the south wall of Building 4 and SLAAP's south fence contained a concrete structure with a brick wall on its west side and structural steel and metallic sheeting on its south side (see Photograph No. 4-6). The top of the concrete structure and the east wall displayed rust staining. South of Building 4 and east of the concrete structure was a grassy area that sloped southward toward the PURO facility property. Next to Building 4's south wall, iron oxide staining was observed on the concrete floor (see Photograph No 4-4). Other than iron oxide staining, the area outside of Building 4 displayed no surface contamination.	4-1, 4-2, 4-4, 4-5, 4-6
	South of Buildings 7 and 7A was a grassy area that sloped southward toward the PURO (formerly SLOP) facility property. The roadway between Buildings 4 and 7 sloped to the south. No evidence of surface contamination was observed at these locations.	4-4, 7-1, 7A-1, 7A-2
	The grassy area south of Buildings 5 and 6 sloped to the south. No surface contamination was observed in this area.	5-2, 6-1
	The area east of Building 5 was inspected. No evidence of surface contamination was observed in this area.	5-1

8.1 BUILDING 1: BILLET CUTTING BUILDING

Building 1 is a vacant building that formerly housed billet breaking equipment. The building is a large, unsecured warehouse currently containing metal debris, four drinking fountains, and a metal storage bin. Process machinery present in Building 1 includes exhaust fans, dust collectors, a heating system, and process tanks in the rafters. The floor of the building has two concrete-filled catch basins and four concrete-filled storage pits. In addition, eight concrete-filled pits are located underneath the former location of the eight break machines, and eight small, rectangular, concrete-filled pits are located directly above these eight pits. In the back of Building 1, there is an uncovered, concrete platform that contains metal debris. Parking lots are located to the east and west of the building in the former steel billet storage areas. Storm sewers line the northern portions of both parking lots.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 1		
Location	**Pertinent Observations**	**Photograph Number**
Building 1, Exterior	Corrugated sheeting which may contain ACM is present on the exterior of the building.	1-1, 1-2, 1-3, 1-4
	Former steel billet storage areas lay east and west of the building. Ten storm sewer catch basins were located adjacent to the northern portions of the parking lots.	1-5, 1-6
Building 1, Interior	Switchboxes and transformers potentially containing PCBs were present in the southwest corner of the building.	1-9
	Approximately 25 transformer ballasts (potentially containing PCBs) from fluorescent lamps were present throughout the building.	1-10, 1-13
	Approximately 10 process tanks were located in the rafters; the contents of the ASTs are unknown.	1-12, 1-14
	One concrete-filled catch basin and two storage pits were present in both the southeast and southwest corners of the building. A manhole was located directly outside the pit in the southeast corner.	1-11, 1-15, 1-18, 1-19
	Eight concrete-filled pits were located underneath the former location of the eight break machines. Eight small, rectangular, concrete-filled pits were located directly above these eight pits.	1-7, 1-8, 1-16, 1-17
	Spilled oil was present on the floor in the west portion of the building.	1-20
	Items present in the building included four drinking fountains and a metal storage bin containing 55-gallon drum lids and other metal debris.	1-21, 1-22

8.2 BUILDING 2: FORGE BUILDING

Building 2 is a vacant building that formerly housed SLAAP forge operations. Currently the building contains 10 circular, concrete pads that held the gas- and oil-fired rotary furnaces used in forge operations. Several smaller concrete pads and shallow pits are located adjacent to the circular pads; these smaller pads and pits are the former locations of hydraulic machinery, quench tanks, and metalwork equipment used to support the forging process. Pipes enter the building from beneath the concrete floor and are also installed in the rafters overhead; the pipes have been severed at the ground surface and at a height of 30 to 40 feet, respectively. Several 3- to 4-foot-deep pits that allowed access to piping beneath the floor are located throughout the building. Most of the pits and pads are filled or covered with concrete rubble and refuse. A tunnel enters the building from the north; the tunnel contains pipes that run from the former locations of the fuel oil storage tanks and the fuel oil pump house in Buildings 8 and 8A.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 2		
Location	**Pertinent Observations**	**Photograph Number**
Building 2, Exterior	Paint, possibly lead-based, was peeling from surfaces on the building exterior.	2-1
	The outside walls were covered with corrugated sheeting containing ACM-like material.	2-2, 2-3, 2-7
	A pipeline tunnel exited the building on the north and led to the former locations of Buildings 8 and 8A. Fuel oil loading pits were present east and west of the tunnel on the road curb. No surface contamination was observed.	2-4
	An electrical substation was present directly east of the building. This area is a former location of Buildings 8 and 8A (from 1958 to 1986). No surface contamination was observed.	2-5, 2-6
	Six storm sewer catch basins were located on the west, south, and east sides of the building.	
	A 10,000-gallon gasoline underground storage tank (UST) was formerly located in the grassy area between the building and Goodfellow Boulevard. The tank was removed in 1992 (Applied Environmental Services, Inc.).	2-8
Building 2, Interior	Ten circular, concrete mounts filled with concrete rubble were located in two rows of five on the east and west sides of the building. These pads formerly held the gas- and oil-fired rotary furnaces (COE 1945).	2-9
	Several shallow pits filled with concrete rubble were located next to the remains of each rotary furnace pad. These pits were the former locations of hydraulic draw benches, aboveground quench oil tanks, and metalworking machinery (COE 1945).	2-10, 2-14

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 2		
Location	**Pertinent Observations**	**Photograph Number**
Building 2, Interior (Continued)	Two large areas containing concrete pads and concrete rubble were present on the east and west sides of the building. These areas formerly contained pumps and motors used to support compressed air accumulators.	2-11
	Overhead piping was present in several areas throughout the building. The pipes had been severed at a height of 30 to 40 feet. The pipes were used for oil, high-pressure steam, and water transfer and as electrical conduits.	2-12, 2-19
	Small, 3- to 4-foot deep pits were present in several areas of the building. These pits were presumably used to access piping and machinery below the ground floor. The pits were generally open, and some contained refuse. At least one was covered with a metal plate.	2-13, 2-25, 2-31
	A 5-foot-deep pit present along the north wall. The pit allowed access to the pipeline tunnel that exited the building on the north side and eventually led to the former locations of Building 8. The tunnel contained pipelines formerly used for fuel oil input and return, high-pressure steam, and water.	2-15, 2-16
	An oil-stained area was located adjacent to a rotary furnace pad in the north portion of the building. The stained area contained some unidentified paper waste.	2-17
	Pieces of ACM (Transite™) were present on the floor in the northeast corner of the building.	2-18
	Refuse and debris were observed at several locations throughout the building. The waste and debris included brush, concrete rubble, waste concrete, absorbent material, and soil.	2-20, 2-27, 2-30
	Several pipes entered the building through the concrete flooring. The pipe sizes ranged from 1.5 to 6 inches in diameter. The pipes formerly contained fuel oil, high-pressure steam, water, electrical wires, natural gas, and sewage (COE 1945).	2-21, 2-23
	Midway along the east and west walls of the building, two identical second-floor rooms formerly contained electrical switching equipment and transformers that may have contained PCBs.	2-22
	Electrical switchboxes were installed on a building column and along the south wall.	2-24, 2-26
	Three empty, metal bins were located in the southwest corner of the building. Their former contents are unknown.	2-28
	Paint, possibly lead-based, was peeling from several surfaces inside the building.	2-29

8.3 BUILDING 3: MACHINING BUILDING

Because Building 3 is the most complex structure on the SLAAP property, this section describes the building's current environmental condition by floor.

Basement

Friable ACM, urea crystals, and solid waste were observed throughout the basement of Building 3. Oil staining was detected in the far east portion of the basement in and around the quench oil pump room and at the foundation walls.

First Floor

The first floor of Building 3 was vacant. Open space extended from the northeast portion of the floor to the west portion. Two separate office spaces were observed, one in the center of the first floor and one in the west portion. The office spaces were vacant at the time of the site inspection. The floor in the open area of the first floor had been capped with concrete and was freshly painted.

Second Floor

On the second floor of Building 3, the east section contained open space. Office areas were present along the south and west portions of the floor. The open area had chain-link fencing around openings in the floor that had been used for quench oil operations. The floor in the open area had been capped with concrete and appeared to be freshly painted. The office areas were vacant. Water damage was observed in the ceiling tiles of the office areas, indicating leaks from the roof.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 3		
Location	**Pertinent Observations**	**Photograph Number**
Building 3, Exterior	Corrugated sheeting containing ACM is present on the exterior of the building.	3-1, 3-2, 3-3, 3-4, 3-5
	The former quench oil UST remote fill-pipe was observed near the northeast corner of the building.	3-6

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 3		
Location	**Pertinent Observations**	**Photograph Number**
Building 3, Basement	Pipe insulation probably with friable ACM, miscellaneous trash, and used personal protective equipment were identified in the north-central portion of the basement near the chip chute area.	3-7
	Heating system expansion tanks were located in the central portion of the basement. Heating system piping was wrapped in ACM material.	3-8
	Standing water from apparent seepage was present in the area of the expansion tanks. The water was mixed with oil that apparently migrated down from the first floor via columns.	3-9
	Five empty steel tanks were observed in the central portion of the basement. These tanks were of open construction with individual piping and pump systems. The use of the tanks is unknown; however, the configuration of the tanks indicated that they were used in fire suppression activities.	3-10
	An open drain was observed in the central portion of the basement. Polyvinyl chloride (PVC) piping had been run to the drain from the west side of the basement indicating that the piping was installed during the renovation activities of the 1980s.	3-11
	The quench oil pump room was observed on the east side of the basement. The room was made largely of brick and the original Building 3 foundation formed its east wall. The room contained two pumps with associated motors and a piping and manifold system. The floor of the quench oil pump room, the basement floor surrounding the room, and columns near the room were stained with oil. A 5-gallon bucket of cement was found in the quench oil pump room.	3-12, 3-13, 3-14, 3-15, 3-16, 3-17, 3-18
	Oil staining was observed on the east foundation wall.	3-19
	The bottom of the grease pit was observed in the southwest portion of the basement. The grease pit appeared to be made of concrete and had a drain leading into the floor of the basement. Oil and grease staining was observed on the grease pit drainpipe. This drain connects to the sewer system.	3-20, 3-21
	Equipment used for lifting consisting of a motor driven pulley was found north of the utility corridor between Building 3 and Building 6.	3-22
	A steel separator tank was identified in the south-central portion of the basement. The tank was of open construction and contained dry, oxidized material. Piping from the separator tank made a loop in the area of the former paint booths, indicating that the tank may have been a separator or mixing tank for oil-based paint, paint wastes, or solvents. A 55-gallon drum containing trash was located immediately southeast of the tank.	3-23, 3-24, 3-25
	The four transformer rooms originally located in the basement had been converted into electrical cable cases. Oil stains were observed in former Transformer Room 4 in the northwest portion of the basement.	3-26, 3-27

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 3		
Location	**Pertinent Observations**	**Photograph Number**
Building 3, Basement (Continued)	A concrete sedimentation basin was located in the northwest portion of the basement. The basin was filled with debris and was in a state of disrepair. Piping ran from the basin to the northwest corner of the basement, where it presumably connected with the sewer system.	3-28
	Bags of lime were observed throughout the basement.	3-29
	Friable ACM material and metal shavings were observed in the vicinity of the chip chute and chip chute conveyor.	3-30
Building 3, First Floor	Information collected during the record search indicates that the northeast portion of the first floor was used for hazardous material storage. This area was vacant and had no staining.	3-31
	The east area of the first floor contained 14 quench oil tanks formerly used in the metal hardening process. The concrete structural footers for each tank were observed. Each quench oil tank had one drain and two oil flowlines. The ceiling above each tank was open to the second floor, where the hardening furnaces were located.	3-32, 3-33, 3-34, 3-35
	The four switch rooms on the first floor had been renovated. Each of the switch rooms contained switching gear, electrical meters, and one 300-kilovolt transformer. Ceiling-mounted transformers and buswork were located throughout the open areas of the first floor. Because the electrical equipment was installed in the late 1980s it is unlikely that it contained PCB oil.	3-36, 3-37, 3-38, 3-39, 3-40
	A plywood paint booth was observed in the southeast portion of the first floor. The paint booth was equipped with a ventilator hood.	3-41, 3-42
	A ventilator hood and drain were observed in the former solvent area in the southwest portion of the first floor.	3-43
	Telephone wiring hubs were located in the central office space area and in the office space on the west side of the first floor.	3-44, 3-45
	Cracks in the concrete cap were observed in the central and west portions of the first floor.	3-46, 3-47
	New paint was observed cracking and peeling from structural steel in the east portion of the first floor.	3-48
	Fire extinguishers were observed in the central portion of the first floor. They were packaged on pallets and appeared to be ready for shipment.	3-49
	Fluorescent light fixtures were stored in a room in the northwest portion of the first floor.	3-50
	A scale was observed in the northwest portion of the first floor.	3-51
	A column-mounted compressor and motor for cooling were observed. The cooling lines could not be traced.	3-52

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 3		
Location	**Pertinent Observations**	**Photograph Number**
Building 3, Second Floor	The east side of the second floor contained the structural footers of the hardening furnaces. Chain-link fencing protected the openings in the floor, which were required for the piping from the quench oil tanks located on the first floor.	3-53, 3-54
	A raised "computer" floor made of particle board tiles was observed in an office space near the walkway leading from Building 3 to Building 5. Additionally, a 300-kilovolt transformer and an emergency power supply were observed in this space. The emergency power supply probably contained lead-acid batteries.	3-55, 3-56, 3 57
	The concrete cap applied to the second floor was missing in portions of the hardening furnace area.	3-58
Building 3, Penthouse 1	Penthouse 1 was located in the west portion of the building and contained motors, electrical switching, and relays for the elevator system. Oil from the elevator motor and pulley system was observed in stains on the floor. Used personal protective equipment was observed near the electrical switching.	3-59, 3-60, 3-61
Building 3, Penthouse 2	Penthouse 2 was located in the west portion of the building and contained motors, electrical switching, and relays for the elevator system. Oil from the elevator motor and pulley system was observed in stains on the floor. Roofing materials were also observed in this penthouse.	3-62, 3-63, 3-64, 3-65

8.4 BUILDING 4: AIR-COMPRESSOR BUILDING

Building 4 is a vacant building that formerly housed air compressor operations. The building consists of two rooms: the air compressor room and the electrical switching room. During the site inspection, the air compressor room contained six clusters of concrete pads and adjacent pits that formerly held the air compressor units and supporting equipment. The room also contained refuse, scrap equipment, and unidentified metal parts. The electrical switching room contained two transformers, a switching bank, and several pallets of unused electrical switchboxes. A small basement area underneath the electrical switching room presumably contained piping that enters the south end of the air compressor room through the concrete floor.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 4		
Location	**Pertinent Observations**	**Photograph Number**
Building 4, Exterior	The outside walls were covered with ACM corrugated sheeting.	4-1, 4-2
	Paint, possibly lead-based, was peeling from surfaces on the building exterior.	4-3
	Nine pipe outlets emerged from the east side of the building. These were air intakes for the former air compressor units.	4-4
	A row of pipe vaults was located on the west side of the building.	4-5
	A concrete pad located outside the southeast corner of the building was the former location of two transformers that may have contained PCBs.	4-6
Building 4, Interior	The air compressor room contained six clusters of concrete supports that formerly held air compressor units. Several pits that accommodated air compressor motors and pumps were located around the supports. The pits contained concrete rubble and refuse.	4-7, 4-10, 4-11
	An unidentified piece of equipment was observed in the northeast corner of the air compressor room.	4-8
	High-pressure steam pipes formerly used for heating the building were installed overhead.	4-9
	Several pieces of unused or scrap equipment and parts were stored in the south portion of the air compressor room. The items included natural gas heaters and unidentified metal parts. Several pipes entered the room from a vault in the south portion of the room. These pipes formerly contained compressed air, high-pressure steam, and electrical wires. The vault was covered with stored equipment.	4-16, 4-15, 4-12
	A 55-gallon drum and a metal bin containing refuse were located in the south portion of the air compressor room.	4-13, 4-14
	Ventilation ducts for the steam heating system were installed overhead. Paint, possibly lead-based, was peeling from the ducts.	4-17
	Pressure release pipes were observed on the south wall of the air compressor room.	4-18
	The electrical switching room lays to the south of the air compressor room. The entrance to the switching room was obstructed by several pallets containing unused electrical switchboxes.	4-19
	The floor underneath the pallets had been painted. The paint, possibly lead-based, was peeling from the floor.	4-20
	The switching room contained two 14,000-volt transformers and a switchbank with eight 4,160-volt switches. It is not known whether the transformers or switches contained PCBs.	4-21, 4-22, 4-23, 4-24

8.5 BUILDING 5: HEADQUARTERS AND OFFICE BUILDING

Building 5 is vacant. The first and second floors of Building 5 were renovated and upgraded as office space in 1984. The only remaining office equipment in the building was rolls of telephone wire pulled from the sockets in the walls. The penthouse of Building 5 housed elevator machinery for the freight elevator, and the basement of Building 5 housed three transformers and a heating system.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 5		
Location	**Pertinent Observations**	**Photograph Number**
Building 5, Exterior	Corrugated sheeting which contains ACM material is present on the exterior of the building.	5-1, 5-2, 5-3
Building 5, Basement	Transformers potentially containing PCBs were found in the basement.	5-8, 5-9
	A heating system aboveground storage tank and pipes in the basement contained ACM-like material.	5-10
Building 5, First Floor	Fluorescent light ballasts potentially containing PCBs (due to age of equipment) were identified throughout the first floor.	The photograph did not develop clearly.
	An elevator switchbox potentially containing PCBs was identified adjacent to the freight elevator.	5-4, 5-5
	Debris on the first floor included telephone lines pulled from sockets.	The photograph did not develop clearly.
Building 5, Second Floor	Fluorescent light ballasts potentially containing PCBs were identified throughout the second floor.	The photograph did not develop clearly.
	Debris on the second floor included telephone lines pulled from sockets.	The photograph did not develop clearly.
Building 5, Penthouse	Elevator machinery with oil stains was identified in the penthouse. The transformer for the elevator potentially contained PCBs.	5-6
	Paint chips, possibly lead-based were found in the stairway to the penthouse.	5-7

8.6 BUILDING 6: WEST OFFICE AND LABORATORY BUILDING

Building 6 is vacant. The first and second floors of Building 6 were renovated and upgraded as office space in 1984. The only remaining office equipment in the building was rolls of telephone wire pulled from the sockets in the walls. An open hearth was found in a small room on the first floor of Building 6,

and a vaulted door was found on the second floor. The uses of the open hearth and the vaulted door are unknown. The basement of Building 6 housed three transformers and a heating system.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 6		
Location	**Pertinent Observations**	**Photograph Number**
Building 6, Exterior	Corrugated panels which contains ACM-like material, were present on the exterior of the building.	6-1, 6-2
Building 6, Basement	Transformers potentially containing PCBs (due to age of equipment) were found in the basement.	6-7, 6-8
	Standing water was found on the basement floor.	6-9, 6-10
	Pipes potentially containing ACM insulation were found in the basement.	6-11
Building 6, First Floor	Fluorescent light ballasts potentially containing PCBs were identified throughout the first floor.	The photograph did not develop clearly.
	Switchboxes potentially containing PCBs (due to age of equipment) were identified in a small room on the first floor.	6-3
	An open hearth was found in a small room on the first floor. The use of the open hearth is unknown.	6-4, 6-5
	Debris on the first floor included telephone lines pulled from sockets.	The photograph did not develop clearly.
Building 6, Second Floor	Fluorescent light ballasts potentially containing PCBs were identified throughout the second floor.	The photograph did not develop clearly.
	A safe was found on the second floor. The contents of the safe are unknown.	6-6
	Debris on the second floor included telephone lines pulled from sockets.	The photograph did not develop clearly.

8.7 BUILDING 7: WATER PUMP HOUSE

Building 7 is a vacant building that formerly housed process water pumps. The pumps transferred water to and from an adjacent cooling tower (Building 7A). During the site inspection, Building 7 contained three concrete pads that formerly held the water pumps, severed water pipes installed in the walls, and a water quality testing kit.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 7		
Location	**Pertinent Observations**	**Photograph Number**
Building 7, Exterior	The building was made of concrete blocks and had a flat, tar and gravel roof.	7-1
	Paint, possibly lead-based, was peeling from surfaces on the building exterior.	7-2
Building 2, Interior	The building contained three concrete pads that formerly held water pumps used to transfer process water to and from an adjacent cooling tower.	7-3
	Severed water pipes entered the west and north walls of the building.	7-4, 7-5
	A water quality testing kit was mounted on the east wall of the building. The kit was removed in Mar 99.	7-5

8.8 BUILDING 7A: COOLING TOWER

Building 7A consists of the concrete foundation and cold well of a former cooling tower.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 7A		
Location	**Pertinent Observations**	**Photograph Number**
Building 7A	The cooling tower cold well appeared to have been filled in with aggregate. No contamination of the aggregate surface was visible.	7A-1, 7A-2
	A sump with a metal cover was located between the cooling tower foundation and Building 7.	7A-3

8.9 BUILDINGS 8 AND 8A: FUEL STORAGE AREA AND OIL PUMP HOUSE

Building 8 was an open area surrounded by earthen berms. The area contained nine ASTs used to store fuel oil for the rotary furnaces in Building 2. From 1944 to 1958, Building 8 was located north of Building 2 in an area now occupied by I-70. In 1958, Building 8 was relocated to the east side of Building 2, where it remained until 1986. Currently the area east of Building 2 is occupied by a parking lot and an electrical substation. During the site inspection, a portion of a tunnel that held pipes running from both Building 8 locations to Building 2 was visible on the north side of Building 2. Fuel oil loading pits were formerly located west and east of the tunnel on the curb of the road adjacent to the north side of Building 2. No visual evidence of the pits remained. Building 8A, the Oil Pump House, lay within the Building 8

area. Building 8A contained oil pumps and heaters used to transfer fuel oil from Building 8 to Building 2. The pump house was relocated along with Building 8 in 1958 and was demolished when the ASTs in Building 8 were removed.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 8		
Location	**Pertinent Observations**	**Photograph Number**
Buildings 8 and 8A, Original Location	The original location of Buildings 8 and 8A is now part of the entrance to the eastbound ramp to I-70 from Goodfellow Boulevard. No surface contamination was observed.	11-1
Buildings 8 and 8A, Location from 1958 to 1986	The location of Buildings 8 and 8A from 1958 to 1986 was observed. The area now contains a parking lot and an electrical substation. No surface contamination was observed.	2-29, 2-30
	A pipeline tunnel exited Building 2 on the north and led to the former locations of Buildings 8 and 8A. Fuel oil loading pits were formerly located east and west of the tunnel on the road curb. No surface contamination was observed.	2-28

8.10 BUILDINGS 9 AND 9A THROUGH 9D: ACETYLENE GENERATION AREA

The Building 9 area now contains an asphalt-covered parking lot.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDINGS 9 AND 9A THROUGH 9D		
Location	**Pertinent Observations**	**Photograph Number**
Building 9 Area	The area where Buildings 9, 9A, 9B, 9C, and 9D were located was inspected. The parking had no visible surface contamination.	9-1

8.11 BUILDING 10: QUENCH OIL STORAGE TANKS

Building 10 is the outdoor area east of Building 3 where quench oil storage tanks were formerly located.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDING 10		
Location	**Pertinent Observations**	**Photograph Number**
Building 10, Exterior	The area where gasoline tank 105; the sludge pit; and quench oil USTs 15, 17, and 87 were located was inspected. This area extended from 3 to 20 feet east of the east wall of Building 3 and between the southeast corner (immediately north of the Building 3 southeast overhead entrance door) and northeast corner of Building 3. Fill material observed on the ground surface of the area was similar to aggregate CA-7 or smaller. Neither groundwater monitoring wells, nor surface contamination were observed in the area east or northeast of Building 3.	Sitewide-11
Building 3, Basement	Significant oil stains and free oil were observed on the Building 3 basement east wall and on the interior floor surface near the wall.	3-6, 3-12

8.12 BUILDINGS 11, 11A, AND 11B: FOAMITE GENERATOR BUILDING AND HOSE CART SHELTERS

Building 11 is vacant. Building 11 was the foamite generator building. Buildings 11A and 11B were used to house the fire fighting hoses and carts used to convey the generated foamite.

SUMMARY OF SITE INSPECTION OBSERVATIONS FOR BUILDINGS 11, 11A, AND 11B		
Location	**Pertinent Observations**	**Photograph Number**
Buildings 11, 11A, and 11B, Original Location	The area north of Building 2 where Buildings 11, 11A, and 11B were formerly located is currently part of the entrance to the eastbound ramp to I-70 from Goodfellow Boulevard.	Sitewide-14, Sitewide-27
Building 11, Current Location	Building 11 is a one-story, concrete block building similar to the original Building 11 except that the Hose Cart Shelter (Building 11A) has been incorporated in the building. Other than rust-like staining on the sidewalk next to Building 11, no contamination of the ground surface was observed around the perimeter of the building. The inspection team could not access the foamite generation area, but the interior of Building 11 was observed through the glass window in the west wall. The building appeared to be empty except for some trashlike material.	11-1, 11-2, 11-3

9.0 CURRENT ENVIRONMENTAL ACTIONS

Numerous environmental actions have been completed at SLAAP over the last 20 years. These actions include UST removals and preparation of corrective action reports; PCB and pesticide investigations; ACM, LBP, and radon surveys; and other environmental assessment surveys. As part of the EBS, available documentation on recent environmental actions that have occurred at SLAAP was researched. This section identifies the reports reviewed as part of the EBS and describes in more detail the results of the UST, PCB, pesticide, ACM, LBP, and radon investigations and surveys.

9.1 REPORTS REVIEWED

The following reports were reviewed during the EBS to identify recent environmental actions at SLAAP:

- Applied Environmental Services, Inc. No date. "Corrective Action Plan for St. Louis Army Ammunition Plant, 4800 Goodfellow Boulevard, St. Louis, Missouri."
- U.S. Army Toxic and Hazardous Materials Agency. 1979. "Installation Assessment of St. Louis Army Ammunition Plant." Report No. 153. December.
- MacDonald and Mack Partnership. 1984. "Historic Properties Report, St. Louis Army Ammunition Plant, Missouri." August.
- Environmental Science and Engineering, Inc. 1987. "Update of the Initial Installation Assessment of St. Louis Army Ammunition Plant, St. Louis, Missouri." July.
- U.S. Army Corps of Engineers (COE). 1989. "Investigation and Evaluation of Underground Storage Tanks, St. Louis AAP, St. Louis, Missouri." September.
- PFE. 1991. "ACM Survey for the Saint Louis Army Ammunition Plant." July.
- Chelan, J.D. 1992. "Underground Storage Tank Investigation, St. Louis Army Ammunition Plant, 4800 Goodfellow, St. Louis, Missouri." 3 Feb.
- PFE. 1992. "Radon Survey Report for Buildings 3, 5, and 6." September.
- U.S. Army Environmental Hygiene Agency. 1993. "Preliminary Assessment Screening No. 38-26-K19X-93, St. Louis Army Ammunition Plant, St. Louis, Missouri." January.
- Applied Environmental Services, Inc.. 1993. "Results of Lead Wipe Sampling in PF&E Office and Storage Areas." M92-11-109.03. 12 Apr.
- Dames & Moore. 1994a. "Building 3 Basement Characterization Report." 30 Aug.

- Dames & Moore. 1994b. "Remediation Design and Development Report." 19 Sep.
- Rust Remedial Services, Inc. 1994. "Final Report of Analytical Results, St. Louis Army Ammunition Plant, PCB Decontamination and Testing of Building 3 Project, St. Louis, Missouri." 29 Aug.
- Woodward Clyde-Consultants. 1996. "Health-Based Risk Assessment, Building No. 3, Army Ammunition Plant, St. Louis, Missouri." June.

9.2 UNDERGROUND STORAGE TANKS

The review of documents related to the UST characterization and removal revealed that six USTs were installed and used at the SLAAP. The six USTs included three steel quench oil tanks; one concrete sludge pit; and two steel gasoline tanks. The quench oil tanks ranged in volume from 14,000 to 15,000 gallons; the sludge pit had a volume of approximately 10,000 gallons; and the gasoline tanks had volumes of approximately 6,000 and 11,000 gallons.

The three steel quench oil tanks (tanks 15, 17, and 87) were installed adjacent to the east wall of Building 3 during the building's construction in 1944 (see Figure 6-1). The tanks contained #6 fuel oil that was used as quench oil in Building 3 in the 105mm shell production process from 1944 to 1969. The fourth UST, the concrete sludge pit, was installed next to the quench oil tanks in 1944 and received used quench oil from Building 3 (see Figure 6-1). This pit is identified as the "quench oil sludge tank" in historical as-built drawings. Residues were allowed to settle out of the used quench oil in the pit before the oil was reused. The 6,000-gallon gasoline UST (tank 105) was installed east of Building 3 and was used to fuel vehicles and other gasoline-powered equipment at SLAAP with regular (leaded) gasoline (see Figure 6-1). This tank was installed as a replacement for a gasoline UST installed in 1941, but removal and replacement records for the original UST could not be located. In 1969, when 105mm shell production at SLAAP ceased, the contents of the five documented USTs were removed, and the quench oil tanks, sludge pit, and gasoline tank were filled with water. In 1945, a 10,000-gallon gasoline UST (tank 101) was installed west of Building 2 (see Figure 6-1). According to installation records, the tank was abandoned and reportedly filled with sand in 1959.

In Sep 89, COE conducted an investigation and evaluation of the six USTs at SLAAP. COE inventoried the USTs and recommended that all six tanks be properly removed or closed.

An investigation of the six USTs was conducted in 1992 in preparation for their removal. The investigation included sampling of the UST contents, installation of 12 soil borings, and collection of subsurface soil samples. Analysis of the UST contents revealed that each quench oil tank contained mostly water with 1 to 2 percent oil and sludge material, the sludge pit contained water and approximately 5 percent oil and sludge, gasoline tank 105 was filled almost entirely (99.9 percent) with water, and gasoline tank 101 contained a mixture of 25 percent water and 75 percent coal-like fines. The analysis of the liquids from each UST did not detect PCBs and results of analysis of the solids from tank 101 revealed metals at relatively low concentrations. The J.D. Chelan report interprets the metal concentrations as "below toxic levels." Analysis of subsurface soil samples revealed total petroleum hydrocarbon (TPH) concentrations ranging from 11 to 6,530 parts per million (ppm). The higher TPH concentrations were detected in samples collected from 13- to 17-foot depths around the quench oil tanks. A TPH concentration of 491 ppm was also detected in a sample collected near gasoline tank 105 at a depth of 7 feet. Metals were detected at relatively low concentrations in the subsurface soil samples. Subsurface soil samples collected around the gasoline USTs did not contain detectable concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds. In addition, one surface soil sample was collected from a pipe north of gasoline tank 105 that contained a red "solvent-like" material. The pipe did not appear to be connected to the UST. Analysis of the sample revealed BTEX compounds at a concentration of 477,200 ppm.

UST removal activities began in Nov 92. Prior to the removal, approximately 2,300 gallons of water and oil was pumped from the tanks and transported to an oil recycling facility. The six USTs and 1,500 cubic yards of contaminated soil were removed and disposed of. Analysis of soil confirmation samples collected from the excavations indicated that further remedial action was required. A corrective action plan (CAP) was submitted to MDNR on 16 Apr 93. The final version of the CAP was approved by MDNR on 3 Jun 93. The final CAP proposed to (1) remove and properly dispose of approximately 29,000 gallons of water that had collected in the open excavations; (2) excavate additional soil from the excavations of tanks 15, 17, 87, and 105; and (3) collect and analyze soil confirmation samples from all the tank excavations. About 29,000 gallons of storm water and about 300 cubic yards of additional contaminated soil were removed from the tank excavations and sent to a special waste facility. A closure report for the six USTs was submitted to MDNR in Feb 94; however, this document was not available for review. MDNR reviewed the closure report and responded in a letter dated 25 May 94. The MDNR letter required submittal of another CAP to address residual TPH contamination in the UST excavations. In a letter dated 17 Jan 95, MDNR stated that SLAAP UST issues would be overseen by the Federal Facilities Section of MDNR. The letter also stated that the Federal Facilities Section had concerns about chemical wastes that

may have been present at SLAAP in addition to the TPH contamination discussed in the 25 May 94 letter. Closure of the SLAAP UST sites is pending.

9.3 POLYCHLORINATED BIPHENYLS

Oils containing PCBs were used at SLAAP in machining processes. Historical records indicate that the PCB-containing oil, which was called "soluble oil," was used primarily as a coolant in the milling, lathing, and smoothing processes in Building 3. The soluble oil was circulated from the soluble oil and mixing room on the first floor of the building to the machinery on the first and second floors via overhead lines. These lines then fed oil through pipe drops to individual machines.

PCBs were first detected at SLAAP in creosote-treated wood blocks that were removed during Building 3 renovation activities in Mar 91. The PCB detections were confirmed by laboratory analyses conducted by GSA in Apr 91. U.S. EPA Region 7 was then verbally notified about the issue in Apr 91. After additional sampling and analysis of the creosote-treated wood blocks, SLAAP was issued a notification of noncompliance in May 91, and the site was assigned TSCA Docket Number VII-91-304. From Sep 91 through Aug 94, Rust Remedial Services, Inc., performed decontamination activities and confirmatory sampling on the first and second floors of Building 3. Confirmatory sampling activities in 1992 included collection of ambient air samples for PCB analysis. Corrective action consisted of removal of PCB-contaminated wood blocks and removal of PCB-contaminated concrete floors and block walls by scarification on the first and second floors of the building. Additional PCB decontamination was completed in summer 1996 to remove contaminated material from the first floor.

As part of the remedial approach for Building 3, a health-based risk assessment was completed in Jun 96 to determine risk-based clean up levels for the basement and the first and second floors of Building 3. The risk-assessment concluded that chemicals of potential concern in the building (excluding ACM) did not present an unacceptable health impact and that further remediation was not necessary. The ATSDR did not endorse the health-based risk assessment. However, in samples collected during the risk assessment, PCB concentrations exceeded federal guidelines. The highest PCB concentrations were detected in the Building 3 basement near the chip chute structure (see Figure 6-1).

On 7 Aug 97, ATCOM contacted U.S. EPA Region 7 and agreed to complete three tasks for Building 3. The first task was to paint the walls and ceilings and cap the floor with concrete. The second task

involved isolation of the chip chute. The third task consisted of reviewing the risk assessment results for the basement. A copy of this letter is in Appendix F.

9.4 PESTICIDES

Soil and surface wipe samples collected in the basement of Building 3 in Jun 94 by Dames and Moore contained pesticides including 4,4-DDE; 4,4-DDD; 4,4-DDT; dieldrin; endrin; heptachlor epoxide; and gamma-BHC. The origin of the pesticides is not known. The pesticides were addressed in the health-based risk assessment completed in Jun 96. The risk assessment concluded that the pesticides in the basement of Building 3 did not present an unacceptable risk.

9.5. ASBESTOS-CONTAINING MATERIAL

An ACM survey was conducted at SLAAP by PFE in Jun and Jul 91. The survey results are summarized below.

- Corrugated ACM siding was being used on Buildings 1, 2, 3, 4, 5, and 6; building crossovers; and the western guard shack. This material was reported to be nonfriable.
- ACM in stock items consisting of packing and gasket material were reported in Building 4.
- ACM in thermal system insulation (TSI) was found on abandoned pipelines in Building 4A; in Building 7; and in the basements of Buildings 3, 5, and 6. This TSI was found to be in poor condition and was considered friable.
- The floor tile and mastic in Buildings 3, 5, and 6 were found to contain nonfriable ACM.
- The adhesive for paneling in Building 6 was found to contain nonfriable ACM.
- Friable, ACM-containing building material was reported on a 1-inch-diameter hot water line in a pipe chase of Building 5. All pipe chases in Buildings 3, 5, and 6 were suspected of having ACM.

The friable ACM located in the second and first floors of Building 3 was abated during PCB remediation activities. An asbestos survey was completed during this EBS and is included in Appendix K.

9.6 LEAD-BASED PAINT

Paint stripping began in Apr 92 as part of remodeling operations planned to convert buildings at SLAAP to office use. A sample was collected from the first drum of waste generated by the paint stripping and a toxicity characteristic leaching procedure (TCLP) leachate of the sample was analyzed for total lead content; analytical results revealed a total lead concentration of 18.4 milligrams per liter (mg/L). In Jun 92, dust samples were collected during remodeling activities at Building 3. Two dust samples collected from elevations above 8.5 feet were analyzed for total lead content; analytical results revealed total lead concentrations of 5,218 and 33,800 milligrams per kilograms (mg/kg). Wipe samples collected from Building 3 in Oct 93 were analyzed and found to contain lead concentrations ranging from 2,100 to 14,000 $\mu g/100\ cm^3$. In 1993, a preliminary assessment screening (PAS) was conducted by the U.S. Army Environmental Hygiene Agency. The PAS report cites a potential environmental threat of LBP being present in all SLAAP buildings. The PAS report also raises the possibility that water in SLAAP piping could be contaminated with lead from the lead solder used on piping joints.

9.7 RADON

A radon survey of the basements of Buildings 3, 5, and 6 was conducted by PFE from Dec 91 to Jun 92. Army Regulation 200-1 requires that mitigation be undertaken if the average annual radon concentration in a structure exceeds 4 picoCuries per liter (pCi/L) of air. A total of 5 years is allowed to accomplish this mitigation. Radon concentrations in the basements of Buildings 3 and 6 did not exceed 4 pCi/L of air, but the basement of Building 5 had an overall average concentration of 5.29 pCi/L of air. Access to all basement areas in Building 5 was restricted.

10.0 POSSIBLE AREAS OF ENVIRONMENTAL CONCERN

Possible areas of environmental concern have been identified at SLAAP. The sitewide areas of concern are presented first in this section, followed by building-specific areas of concern. Additional investigations of these possible areas of environmental concern are described in Sections 11.0 and 12.0 of this report.

10.1 SITEWIDE AREAS OF CONCERN

Four sitewide possible areas of environmental concern were identified at SLAAP. First, it was determined that the U.S. government purchased a portion of the SLAAP property from General Electric Corporation (GE). A Sanborn fire insurance map indicates that the GE property was vacant when it was purchased; however, it is not known what may have been stored on the property by GE. Second, the PURO facility (formerly SLOP) located to the south and the UST facilities located to the west of the SLAAP property may present environmental concerns involving the property. Third, ACM may be present in each SLAAP building. Fourth, LBP may be present in each SLAAP building.

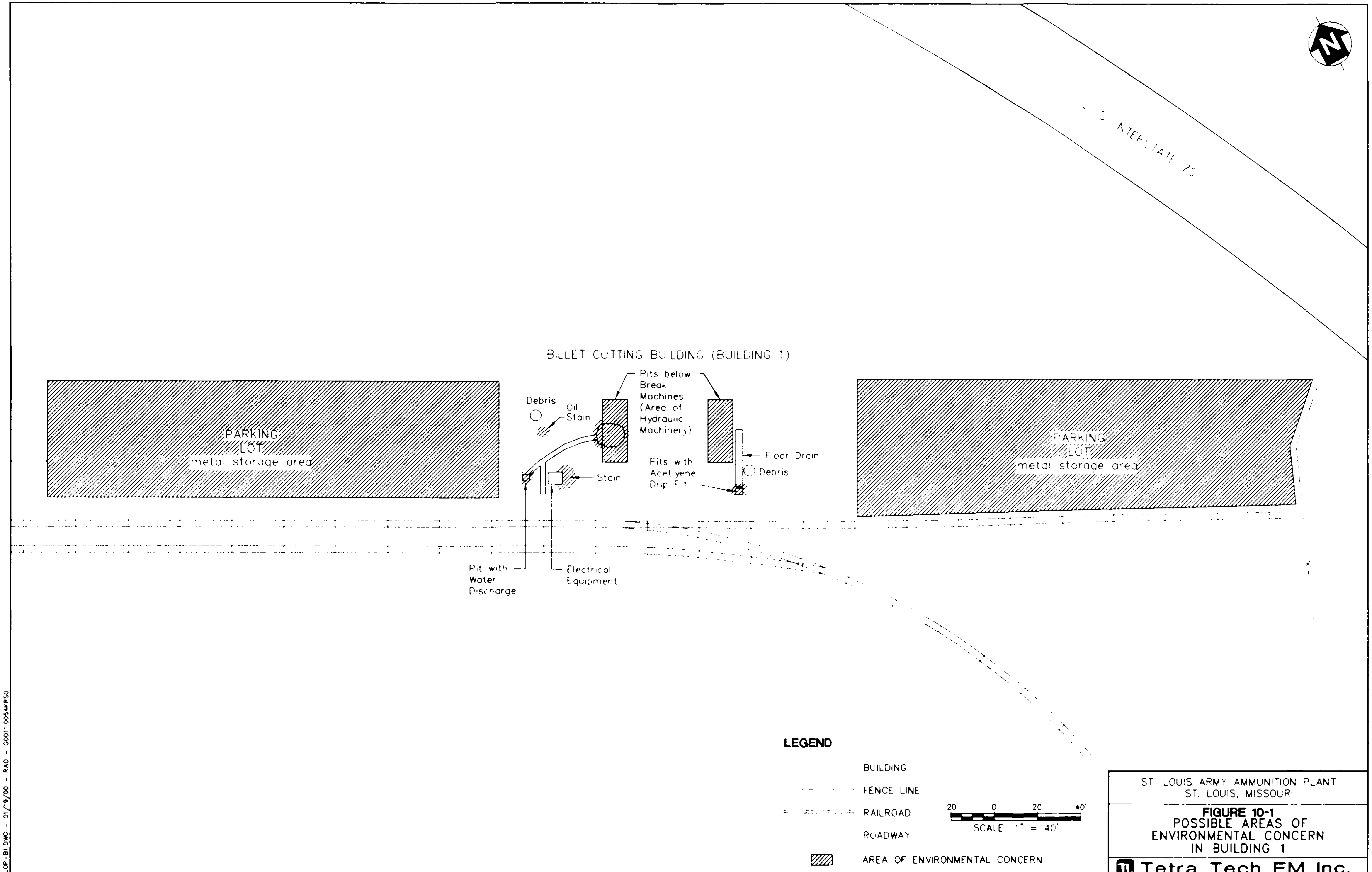
10.2 BUILDING-SPECIFIC AREAS OF CONCERN

possible areas of environmental concern associated with specific SLAAP buildings are discussed below.

10.2.1 Building 1: Billet Cutting Building

The following possible areas of environmental concern were identified in Building 1 (see Figure 10-1):

- Because of the age of the electrical equipment, it may contain PCB oil.
- Debris was present throughout the building.
- Spilled oil was identified in the building.
- Concrete-filled hydraulic oil pits, sumps, and floor drains were identified.
- Two pits connected to the sewer system were observed.
- Outdoor metal storage areas were identified.



ST LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 10-1
POSSIBLE AREAS OF ENVIRONMENTAL CONCERN IN BUILDING 1

Tetra Tech EM Inc.

10.2.2 Building 2: Forge Building

The following possible areas of environmental concern were identified in Building 2 (see Figure 10-2):

- Debris and refuse were present throughout the building.
- The fuel oil pipe run from Building 2 originally extended north to Building 8. When the fuel oil ASTs were moved in 1958, an additional piping run was installed that extended from the north side of Building 2 to the east along the north section of the building and then south to Building 8.
- Subgrade fuel oil product lines were located inside Building 2. These lines fed the rotary furnaces and terminated on the south side of Building 2.
- Equipment that contained hydraulic oil was located in the areas next to each rotary furnace.
- Spilled oil was observed in the northeast corner of the building next to a former rotary furnace.
- A water-filled sump was observed in the building.
- Metal-contaminated soil may be present in the building.

10.2.3 Building 3: Machining Building

The following possible areas of environmental concern were identified in Building 3 (see Figure 10-3):

- PCB- and pesticide-contaminated soil may be present in the former chip chute area in the basement.
- Oil staining was present along the far east foundation wall, on the floor, and on support columns in the vicinity of the quench oil pump room in the basement.
- Friable ACM-like material and metal shavings potentially contaminated with PCBs were observed on the basement floor.
- Oil was found floating on top of water on the floor in the central portion of the basement.
- A steel separator tank was identified in the south-central portion of the basement. The tank was filled with a dried, oxidized material that may be of environmental concern.
- The former transformer vault in the northwest corner of the basement contained spilled oil. This oil may contain PCBs.
- Water was identified in one sump in the basement.

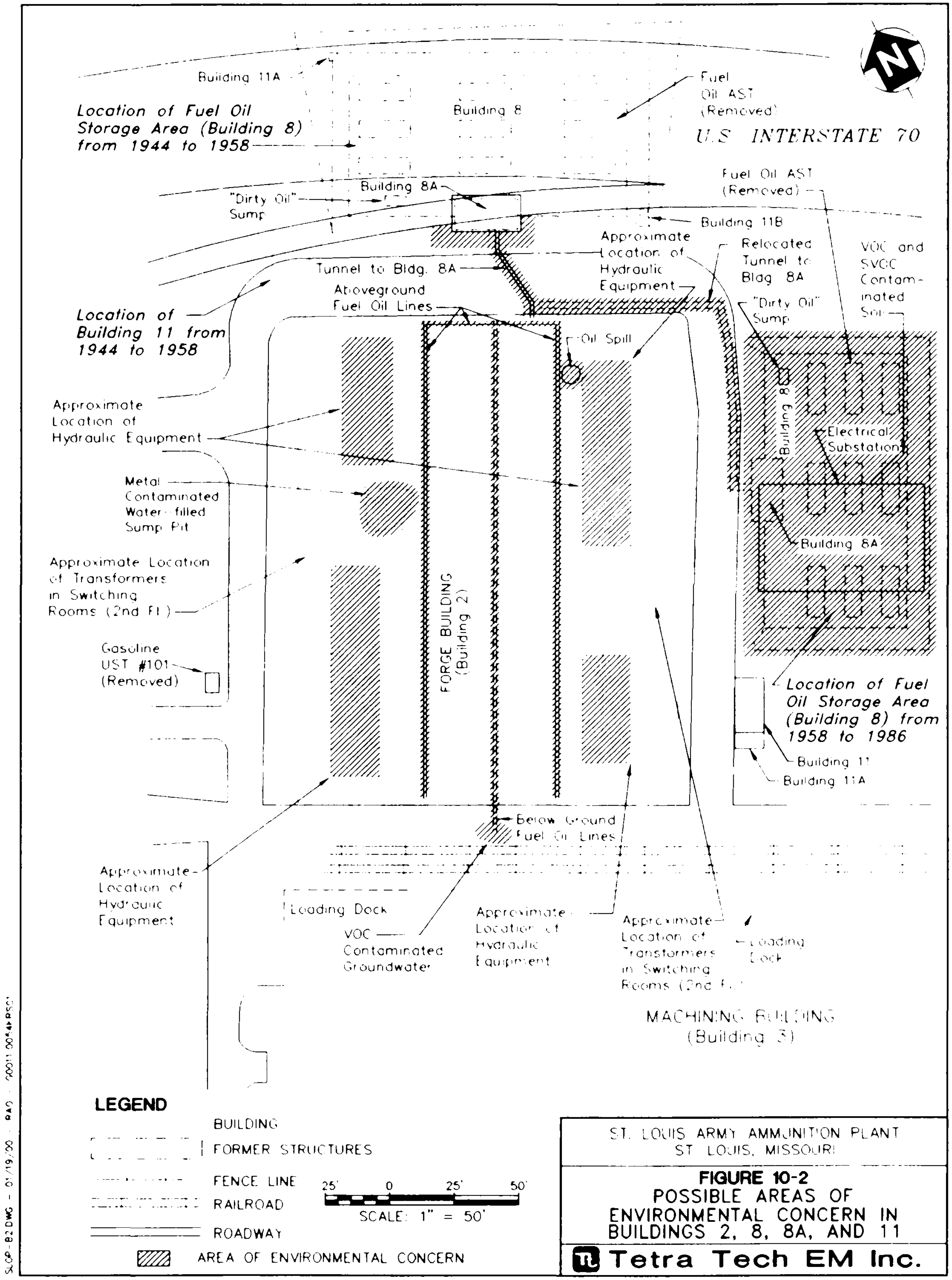
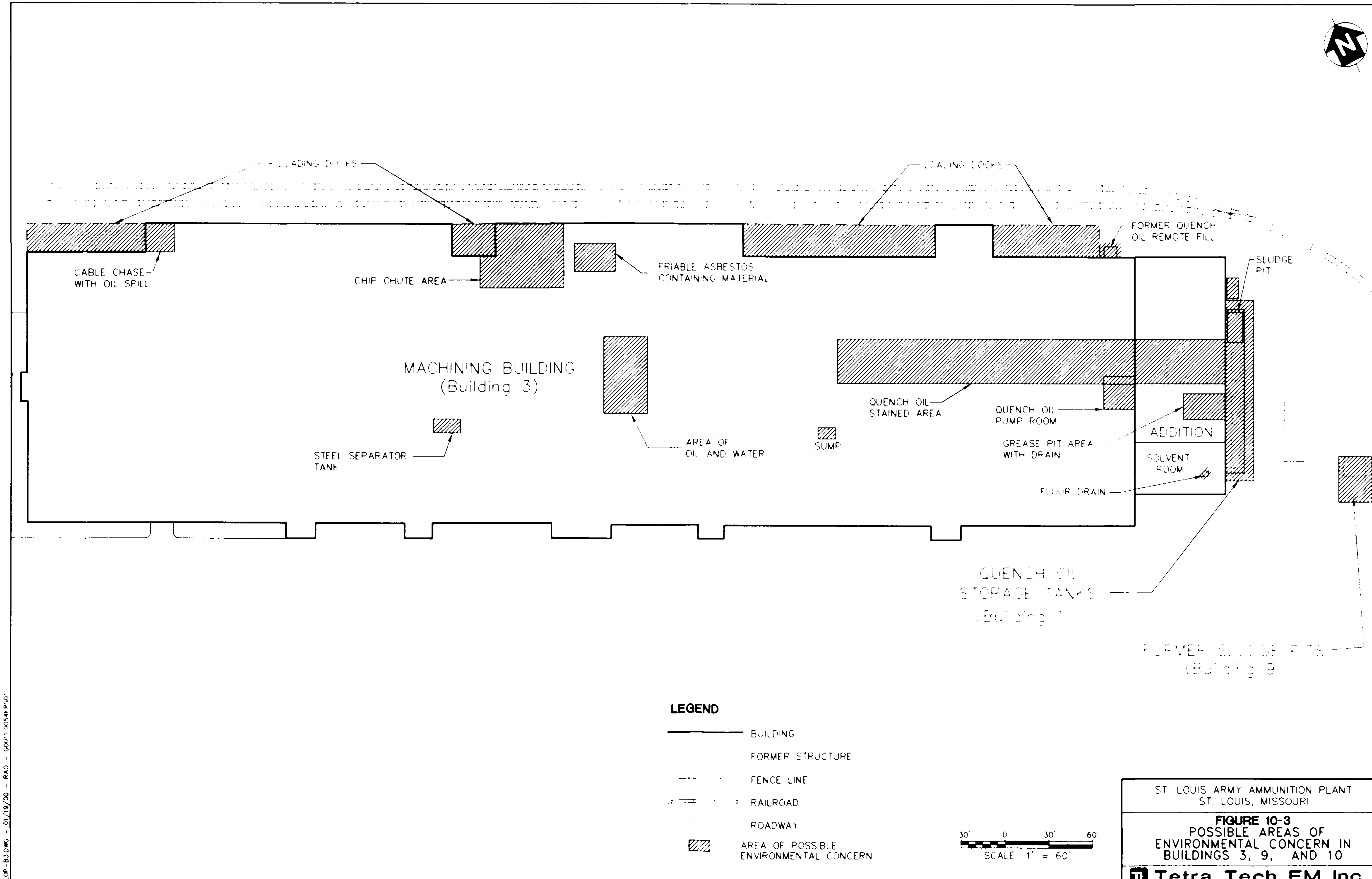


FIGURE 10-2
POSSIBLE AREAS OF ENVIRONMENTAL CONCERN IN BUILDINGS 2, 8, 8A, AND 11



ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 10-3
POSSIBLE AREAS OF ENVIRONMENTAL CONCERN IN BUILDINGS 3, 9, AND 10

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- Cracks in concrete caps were observed on the first and second floors.
- Paint used to seal the steel structures on the first floor was cracking and peeling.
- A solvent area was identified in the Building 3 plans. The solvent area drain was attached to the sewer system, and water was identified in this drain.
- Fluorescent light fixtures that may contain PCB-containing ballasts were identified in a room on the first floor.
- A room on the second floor contained an emergency power supply unit. This unit may contain lead-acid or nickel-cadmium batteries.
- Spilled oil from leaking motors was identified in each of the penthouses. The oil may contain PCBs.
- A remote quench oil fill-pipe was located near the northeast corner of Building 3.

10.2.4 Building 4: Air Compressor Building

Possible areas of environmental concern identified in Building 4 consist of the rubble and debris used to fill the pits below the air compressors, possible PCB-contaminated compressor oils that may have leaked into the pits below the compressors, electrical equipment that may contain PCB oil, and an outdoor transformer storage area (see Figure 10-4).

10.2.5 Building 5: Headquarters and Office Space

Possible areas of environmental concern identified in Building 5 consist of possible areas of explosive and propellant spills, friable ACM-like material in the basement, fluorescent lamp ballasts, LBP chips, and possible PCB-containing oil spilled from elevator machinery in the penthouse (see Figure 10-5).

10.2.6 Building 6: West Office and Laboratory Building

Possible areas of environmental concern identified in Building 6 consist of possible areas of explosive and propellant spills, possible friable ACM-like material, LBP, the ash in the hearth, possible PCB contamination in the tunnel system, and fluorescent lamp ballasts (see Figure 10-5).

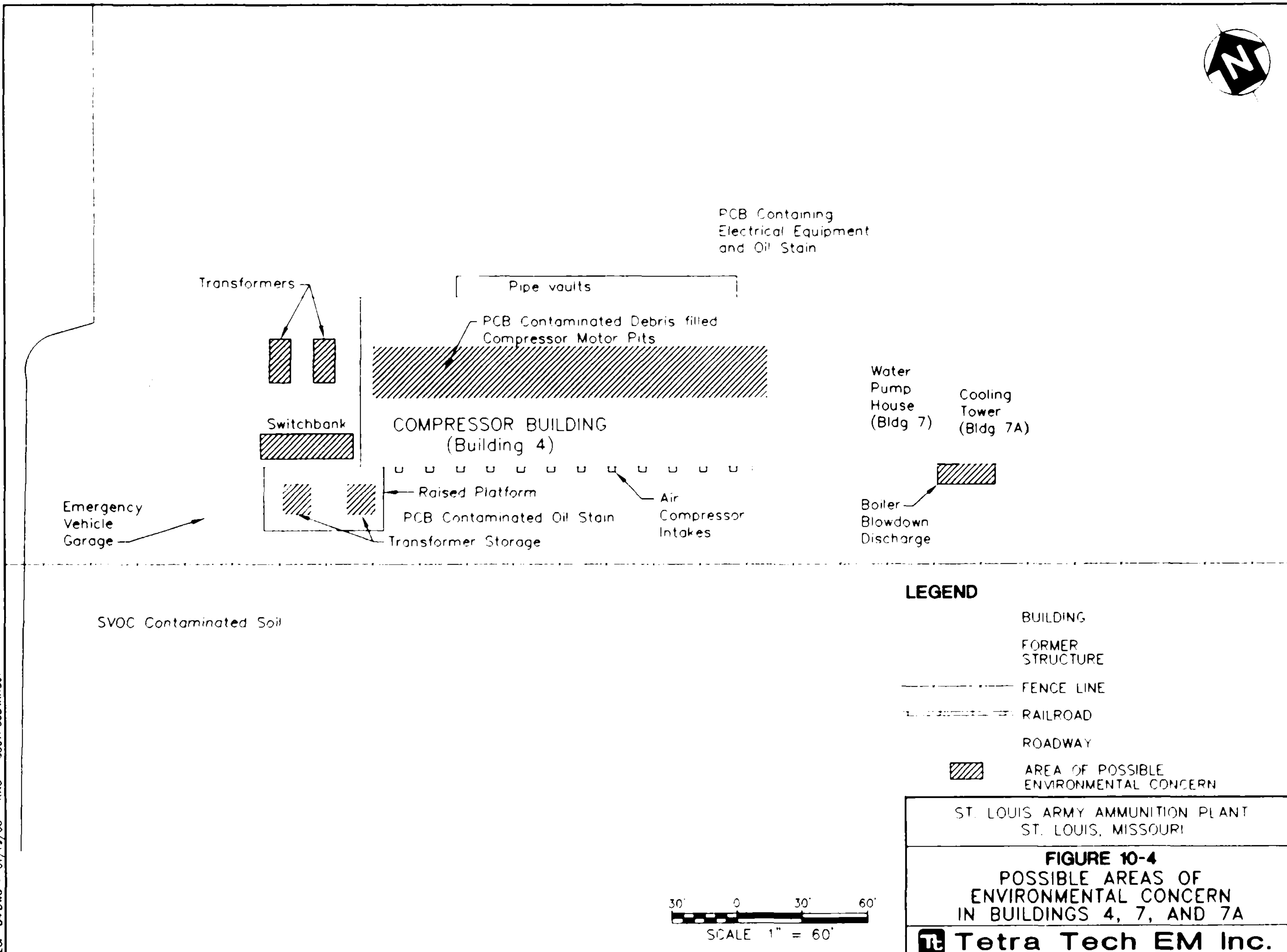

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FIGURE 10-4
POSSIBLE AREAS OF
ENVIRONMENTAL CONCERN
IN BUILDINGS 4, 7, AND 7A

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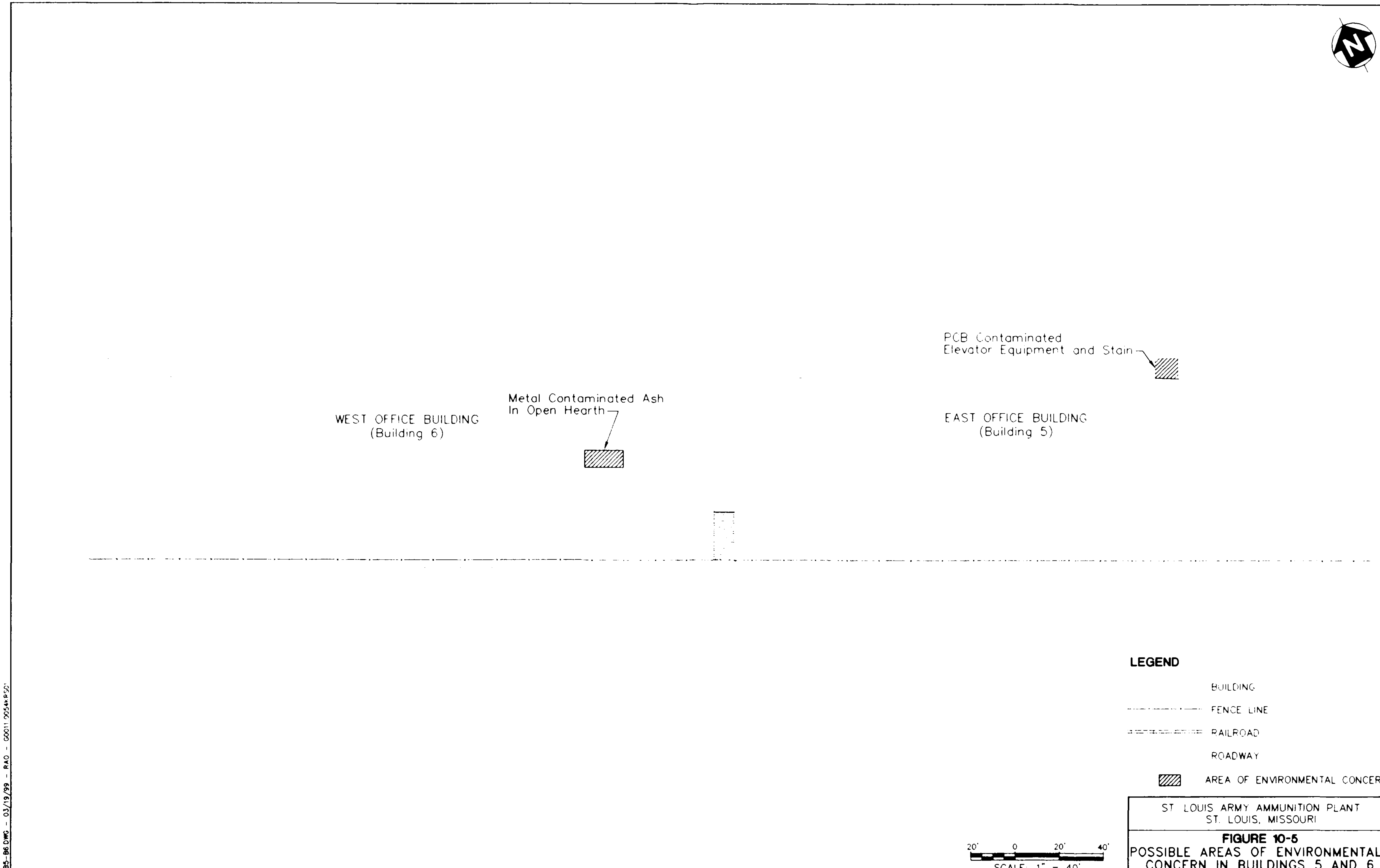

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FIGURE 10-5
POSSIBLE AREAS OF ENVIRONMENTAL CONCERN IN BUILDINGS 5 AND 6

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10.2.7 Building 7: Water Pump House

Possible areas of environmental concern identified in Building 7 consist of possible soil contamination under the boiler blowdown discharge, ACM in the roofing, and possible LBP (see Figure 10-4).

10.2.8 Buildings 8 and 8A: Fuel Storage Area and Oil Pump House

Buildings 8 and 8A have been removed; however, the locations of these buildings are possible areas of environmental concern. The first location of Building 8 and a portion of Building 8A was excavated during construction of I-70. The highway was constructed at an elevation approximately 70 to 80 feet lower than the original ground surface. Therefore, soils potentially impacted by operations in Buildings 8 and 8A were likely removed and do not present an environmental concern. However, the former fuel oil off-loading area remains, and this area is of possible environmental concern. In addition, because the soil was not removed from the second location of Buildings 8 and 8A, because of the presence of the fuel lines, and because of the "dirty sump" associated with the second Building 8 and 8A location, this location is also of possible environmental concern (see Figure 10-2).

10.2.9 Buildings 9 and 9A through 9D: Acetylene Generation Area

The sludge pits in the Acetylene Generation Area constitute a possible area of environmental concern (see Figure 10-3). No records were found concerning the demolition of the Acetylene Generation Area.

10.2.10 Building 10: Quench Oil Tanks

The three quench oil tanks, quench oil sludge pit, and gasoline UST designated as Building 10 were removed. However, residual contamination may be present in the Building 10 area. MDNR has not issued a no further action letter concerning this area. Therefore, this area is of possible environmental concern (see Figure 10-3).

10.2.11 Buildings 11, 11A, and 11B: Foamite Generator Building and Hose Cart Shelters

No possible areas of environmental concern were identified for Buildings 11, 11A, and 11B (see Figure 10-2).

11.0 PHASE II ENVIRONMENTAL BASELINE SURVEY ACTIVITIES

Phase II EBS activities performed at SLAAP consisted of sitewide and area-specific investigations completed to assess the quality of soil and groundwater in possible areas of environmental concern identified during the record search and site visit. Sections 11.1 and 11.2 describe the sitewide and area-specific Phase II EBS activities, respectively. The Phase I results were used to develop a scope of work that included completion and sampling of soil borings, installation and sampling of monitoring wells, wipe sampling, surface soil sampling, concrete core sampling, and an ACM survey. The scope of work for investigating the aforementioned possible areas of environmental was discussed with AMCOM and verbally endorsed by U.S. EPA Region 7 and MDNR. Phase II activities were completed in two separate sampling events. The first Phase II sampling event identified areas of contamination and the second Phase II sampling event was performed to further assess and characterize these areas.

11.1 SITEWIDE ACTIVITIES

Various activities were performed to collect sitewide and multi-area information. Specifically, the following activities were completed:

- Soil boring advancement to characterize the site-specific lithology
- Monitoring well installation to characterize sitewide groundwater
- Groundwater sampling to characterize the quality of groundwater flowing onto and off the installation
- A land survey to determine the vertical and horizontal positions of borings and monitoring wells
- An ACM survey to identify ACM throughout the installation

These activities are described below. Sitewide sampling locations are shown in figures included in Section 12.1.

11.1.1 Lithologic Soil Boring Advancement

Between 9 and 12 Jul 99, nine soil borings (SWMW-1 through SWMW-7, 2MW-1, and 10MW-1) were advanced to characterize the site-specific lithology. The soil borings were advanced to 23 to 38 feet bgs. The soil borings were advanced in accordance with the methods described in Appendix G.

11.1.2 Monitoring Well Installation

Seven sitewide monitoring wells (SWMW-1 through SWMW-7) were installed to characterize groundwater in the shallow aquifer across the installation. Two monitoring wells (2MW-1 and 10MW-1) were installed to characterize groundwater at building-specific possible areas of environmental concern. Construction details for monitoring wells SWMW-1 through SWMW-7, 2MW-1, and 10MW-1 are summarized below.

Monitoring Well Number	Top of Casing Elevation	Top of Ground Elevation	Screened Interval	Filter Pack Interval
SWMW-1	533.25	533.30	502.97 - 512.97	505.97 - 512.0
SWMW-2	535.10	535.36	529.9 - 514.9	532.9 - 515
SWMW-3	535.63	535.92	530.53 - 515.53	532.53 - 515
SWMW-4	536.19	536.26	523.84 - 508.84	526.59 - 507
SWMW-5	532.69	533.01	522.74 - 507.74	525.59 - 507
SWMW-6	526.91	527.05	518.96 - 508.96	521.72 - 568
SWMW-7	525.72	526.17	521.75 - 506.75	520.25 - 504.27
2MW-1	532.76	532.80	524.66 - 514.66	527.41 - 515
10MW-1	535.39	535.56	531.65 - 516.65	533.65 - 516
Note: All values are presented in feet above mean sea level.				

The monitoring wells were installed for collection of groundwater flow and groundwater quality data. Each well was developed using a submersible pump with dedicated, tygon tubing. The wells were developed in accordance with MDNR guidelines. Each well was developed by removing enough well volume to lower the turbidity of the purge water to below 5 turbidity units. Water generated as a result of development was placed in 55-gallon drums.

11.1.3 Groundwater Sampling

Prior to groundwater sample collection, each monitoring well was purged using a peristaltic pump with dedicated tubing to ensure that the groundwater was representative of the formation and that the turbidity of the purge water was below 5 turbidity units. The groundwater sampling information for the seven sitewide monitoring wells is summarized below; the groundwater sampling information for monitoring wells 2MW-1 and 10MW-1 is summarized in Sections 11.2.2 and 11.2.10, respectively.

Monitoring Well Number	Matrix	Analytical Parameters					
		VOCs	SVOCs	Metals	PCBs	Nitroaromatics, TNT, Explosives	Perchlorates, Phosphorous, Nitrates
SWMW-1	Groundwater	✓	✓	✓			
SWMW-2	Groundwater	✓	✓	✓		✓	✓
SWMW-3	Groundwater	✓	✓	✓		✓	✓
SWMW-4	Groundwater	✓	✓	✓		✓	✓
SWMW-5	Groundwater	✓	✓	✓			
SWMW-6	Groundwater	✓	✓	✓			
SWMW-7	Groundwater	✓	✓	✓	✓		

Notes:
SVOC = Semivolatile organic compound
TNT = Trinitrotoluene
VOC = Volatile organic compound

11.1.4 Land Survey

The land survey was completed by Massmann Surveying of St. Louis, Missouri. This survey was performed to determine the vertical and horizontal positions of the soil borings advanced during the EBS. The vertical and horizontal positions of the soil boring and monitoring well locations were determined using a differential global positioning system (DGPS). Additionally, the elevations of the monitoring wells were confirmed by means of a traditional laser survey. The horizontal position of each point of interest was determined using Missouri State Plane coordinates, and the vertical position was determined relative to mean sea level. The surveys were completed using benchmarks provided by the Missouri Department of Transportation.

The soil boring location survey was conducted by placing the DGPS receiver in the center of each soil boring and recording the vertical and horizontal position of that point. For each monitoring well, the elevation survey was conducted on the top of the PVC casing on the north side of the well casing. Additionally, the elevation of the top of the ground was surveyed. After the survey, the well was secured.

11.1.5 Asbestos-Containing Material Survey

An ACM survey was completed for the entire installation. The ACM survey was conducted in accordance with AHERA requirements by a State of Missouri-registered asbestos assessor. The ACM survey identified three major groups of ACM-containing materials. These categories are:

- Thermal system installation (TSI)
- Floor tub and linoleum
- Other materials such as Transite® in walls and ceilings

ACM TSI was detected in Buildings 3, 5, 6, 7, and 13. ACM floor tile and linoleum was detected in Buildings 3, 5, and 6. Other ACM walls and ceilings were detected in Buildings 1, 2, 3, 4, 5, and 6.

The results of the ACM survey are summarized in Section 12.1.4.

11.2 AREA-SPECIFIC SAMPLING ACTIVITIES

This section describes the area-specific sampling activities conducted at Buildings 1, 2, 3, 4, 5, 6, 7, 8 and 8A, 9 and 9A through 9D, and 10; no area-specific sampling was conducted at Buildings 11, 11A, and 11B because no possible areas of environmental concern were identified for them. Where appropriate, the building-specific subsections below contain tables summarizing the sampling points, sampling locations, and analytical parameters. The sample collection methods are discussed in Appendix G. Building-specific sampling locations are shown in figures included in Section 12.2.

Refuse; rubbish; miscellaneous debris; and structural issues involving fluorescent lamp ballasts, cracked concrete, and peeling paint were not investigated as part of Phase II EBS activities and are not discussed below. However, these items are still of possible environmental concern and are addressed in the conclusions and recommendations (Section 13.0) of this report.

11.2.1 Building 1 Sampling Activities

Possible areas of environmental concern identified at Building 1 during the record search and site visit consist of

- Possible PCB-containing electrical equipment
- Spilled oil
- Concrete-filled hydraulic oil pits, sumps, and floor drains
- Two pits connected to the sewer system
- Possible metal contamination in outdoor storage areas

Therefore, the soil and wipe sampling activities summarized below were conducted at Building 1.

Boring/ Sample Number	Sampling Location	Matrix	Analytical Parameters			
			VOCs	SVOCs	Metals	PCBs
1SB-1 and 1SB-1A	West concrete pit connected to sewer system	Soil	✓	✓	✓	✓
1SB-2 and 1SB-2A	East concrete pit connected to sewer system	Soil	✓	✓	✓	✓
1SB-3	East metal storage area	Soil			✓	
1SB-4	West metal storage area	Soil			✓	
1SW-1	Electrical equipment oil stain	Wipe				✓
1SW-2	Miscellaneous oil stain	Wipe				✓

The material in the sumps located within the building has been covered in concrete. Because the material cannot be reached, this material does not pose a threat to human health or the environment, so no samples were collected from the concrete-filled sumps.

11.2.2 Building 2 Sampling Activities

The possible areas of environmental concern investigated at Building 2 consist of

- The fuel oil pipe run from Building 2 that originally extended north to Building 8. When the fuel oil ASTs were moved in 1958, an additional piping run was installed that extended from the north side of Building 2 to the east along the north section of the building and then south to Building 8.

- Subgrade fuel oil product lines inside Building 2. These lines terminated on the south side of Building 2.

- Spilled oil in the northeast corner of the building next to a former rotary furnace

- Possible metal-contaminated soil throughout Building 2

- A water-filled sump in the center of the building

Therefore, the sampling activities summarized below were conducted at Building 2.

Boring/ Sample Number	Sampling Location	Matrix	Analytical Parameters			
			VOCs	SVOCs	Metals	PCBs
2SP-1	Water-filled sump	Water	✓	✓		✓
2Sump	Water-filled sump	Water			✓	
2SW-1	Oil stain	Wipe				✓
2SS-1	Dirt on floor	Soil			✓	
2SS-2	Dirt on floor	Soil			✓	
2MW-1	Fuel line trench terminus	Soil and groundwater	✓	✓	✓	✓

The fuel oil piping that ran from Building 2 to Building 8 was assessed as part of the Building 8 and 8A sampling activities and is further discussed in Section 11.2.8 of this report.

11.2.3 Building 3 Sampling Activities

The possible areas of environmental concern identified at Building 3 consist of

- PCB- and pesticide-contaminated soil that may be present in the former chip chute area in the basement

- Oil staining along the far east foundation wall, on the floor, and on support columns in the vicinity of the quench oil pump room in the basement

- Friable ACM-like material and metal shavings potentially contaminated with PCBs on the basement floor

- Oil found floating on top of water on the floor in the central portion of the basement

- A steel separator tank in the south-central portion of the basement. The tank was filled with a dried, oxidized material that may be of environmental concern.

- The former transformer vault in the northwest corner of the basement that contained spilled oil. This oil may contain PCBs.

- Spilled oil from leaking motors in each of the penthouses. The oil may contain PCBs.

- A remote quench oil fill-pipe near the northeast corner of Building 3

- A water-filled drain trap associated with the solvent room

- A water-filled sump in the basement

Therefore, the sampling activities summarized below were conducted at Building 3.

Boring/Sample Number	Sampling Location	Matrix	Analytical Parameters				
			VOCs	SVOCs	Metals	PCBs	Pesticides
3SB-1	Remote fill location	Soil	✓	✓	✓	✓	
3SB-2	Loading dock	Soil	✓	✓	✓	✓	
3SB-3	Loading dock	Soil	✓	✓	✓	✓	
3SB-4	Loading dock	Soil	✓	✓	✓	✓	
3SW-1 through 3SW-8	Basement chip chute area	Wipe				✓	
3SW-9	Transformer vault	Wipe				✓	
3SW-10	East foundation wall	Wipe				✓	
3SW-11	First-floor chip chute	Wipe				✓	
3SW-12	Second-floor chip chute	Wipe				✓	
3SW-13	West elevator penthouse	Wipe				✓	
3SW-14	East elevator penthouse	Wipe				✓	
3CS-1 through 3CS-4	Basement chip chute	Concrete core				✓	
3CS-5 through 3CS-8	Basement concrete area	Concrete core				✓	
3CS-11 through 3CS-14	First-floor chip chute	Concrete core				✓	
3CS-21 through 3CS-24	Second-floor chip chute	Concrete core				✓	
3SS-1, 0 to 0.5	West side of basement	Soil				✓	
3SS-2, 0 to 0.5	West side of basement	Soil			✓	✓	✓
3SS-3, 0 to 0.5	West side of basement	Soil				✓	
3SS-4, 0 to 0.5	East side of basement	Soil				✓	
3SS-5, 0 to 0.5	East side of basement	Soil			✓	✓	✓
3SS-B6, 0 to 0.5	East side of basement	Soil				✓	
3SS-B6, 1 to 1.5	East side of basement	Soil				✓	
3SS-B7, 0 to 0.5	East side of basement	Soil			✓	✓	✓
3SS-B7, 1 to 1.5	East side of basement	Soil				✓	

Boring/Sample Number	Sampling Location	Matrix	Analytical Parameters				
			VOCs	SVOCs	Metals	PCBs	Pesticides
3SS-B8, 0 to 0.5	East side of basement	Soil				✓	
3SS-B9, 0 to 0.5	East side of basement	Soil				✓	
3SS-B9, 1 to 1.5	East side of basement	Soil				✓	
3SS-B10, 0 to 0.5	East side of basement	Soil				✓	
3SS-B10, 1 to 1.5	East side of basement	Soil				✓	
3SS-11, 0 to 0.5	East side of basement	Soil				✓	
3SS-12, 0 to 0.5	East side of basement	Soil				✓	
3SS-13, 0 to 0.5	East side of basement	Soil				✓	
3SS-14, 0 to 0.5	East side of basement	Soil			✓	✓	✓
3SS-15, 0 to 0.5	East side of basement	Soil			✓	✓	✓
3SS-16, 0 to 0.5	19W5 addition	Soil			✓	✓	✓
3SW-B1 through 3SW-B20, 3SW-B2-21	Concrete portion of basement	Wipe				✓	
AP-1	Under grease pit drain	Soil	✓	✓	✓		
3NSUMP	Basement floor drain	Water		✓	✓	✓	
3NDRAIN	Solvent room floor drain	Water	✓		✓	✓	

11.2.4 Building 4 Sampling Activities

Possible areas of environmental concern investigated in Building 4 consist of the rubble and debris used to fill the pits below the air compressors, possible PCB-contaminated compressor oils that may have leaked into the pits below the compressors, electrical equipment that may contain PCB oil, and an outdoor transformer storage area. Therefore, the soil and wipe sampling activities summarized below were conducted at Building 4.

Boring/ Sample Number	Sampling Location	Matrix	Analytical Parameters			
			VOCs	SVOCs	Metals	PCBs
4SS-1	Pit below air compressor	Soil	✓	✓	✓	✓
4SW-1	Indoor electrical equipment oil stain	Wipe				✓
4SW-A	Outdoor transformer storage area (west)	Wipe				✓
4SW-B	Outdoor transformer storage area (east)	Wipe				✓
4SB-1	Former transformer pad	Soil	✓	✓	✓	✓

11.2.5 Building 5 Sampling Activities

Possible areas of environmental concern identified at Building 5 consist of friable ACM-like material in the basement, fluorescent lamp ballasts, LBP chips, possible spilled explosive- and ammunition-related chemicals, and possible PCB-containing oil spilled from elevator machinery in the penthouse. Therefore, the soil and wipe sampling activities summarized below were conducted at Building 5.

Boring/ Sample Number	Sampling Location	Matrix	Analytical Parameters					
			VOCs	SVOCs	Metals	PCBs	Perchlorates, Nitrates, Phosphorus	Nitroaro-matic, TNT, Explosives
5SW-1	Elevator penthouse	Wipe				✓		
5SW-A	Elevator penthouse (Blank)	Wipe				✓		
5SW-1A	Elevator penthouse	Wipe				✓		
5SW-1B	Elevator penthouse	Wipe				✓		
5SW-1C	Elevator penthouse	Wipe				✓		
5SB-1	Grassy area south of Building 5	Soil	✓	✓	✓	✓	✓	✓
5SB-2	Grassy area south of Building 5	Soil	✓	✓	✓	✓	✓	✓

11.2.6 Building 6 Sampling Activities

Possible areas of environmental concern identified at Building 6 consist of an ash-filled hearth, possible PCB contamination in the tunnel system, and chemical spills that occurred during small arms manufacturing. Therefore, the sampling activities summarized below were conducted at Building 6.

Boring/ Sample Number	Sampling Location	Matrix	Analytical Parameters					
			VOCs	SVOCs	Metals	PCBs	Perchlorates, Nitrates, Phosphorus	Nitroaro-matic, TNT, Explosives
6SS-1	Open hearth	Ash			✓			
6SW-B1	Tunnel area	Wipe				✓		
6SW-B2	Tunnel area	Wipe				✓		
6SW-B3	Tunnel area	Wipe				✓		
6SB-1	Grassy area south of Building 6	Soil	✓	✓	✓	✓	✓	✓
6SB-2	Grassy area south of Building 6	Soil	✓	✓	✓	✓	✓	✓

11.2.7 Building 7 Sampling Activities

The possible area of environmental concern identified at Building 7 consists of the area of soil affected by boiler water blowdown. Therefore, one soil boring (7SB-1) was advanced beneath the boiler blowdown discharge. The soil sample collected from this boring was analyzed for total chromium.

11.2.8 Building 8 and 8A Sampling Activities

Possible areas of environmental concern identified at Buildings 8 and 8A consist of the fuel storage area, "dirty sump" area, original fuel oil off-loading area, and fuel oil lines. Therefore, the soil sampling activities summarized below were conducted at Buildings 8 and 8A.

Boring/Sample Number	Sampling Location	Matrix	Analytical Parameters		
			VOCs	SVOCs	PCBs
8SB-1 through 8SB-6, 8SB-11	Fuel storage area	Soil	✓	✓	✓
8SB-7, 8SB-8	"Dirty sump" area	Soil	✓	✓	✓
8SB-9, 8SB-10	Fuel oil line	Soil	✓	✓	✓
8SB-10	Fuel oil off-loading area	Soil	✓	✓	✓

11.2.9 Building 9 and 9A through 9D Sampling Activities

The possible areas of environmental concern identified in the Building 9 and 9A through 9D area are the sludge pits used during the acetylene generation process. Therefore, one soil boring (9SB-1) was advanced in the area of the sludge pits. The soil sample collected from this boring was analyzed for pH, VOCs, SVOCs, and metals.

11.2.10 Building 10 Sampling Activities

The area of environmental concern identified at Building 10 consists of the soil contamination that may have been left in place after the removal of the USTs and the quench oil sludge pit. The extent of soil contamination and the groundwater quality in this area must be assessed prior to MDNR's issuance of a no further action letter for the UST removal. Therefore, the sampling activities summarized below were conducted at Building 10.

Boring/ Sample Number	Sampling Location	Matrix	Analytical Parameters					
			VOCs	SVOCs	Metals	PCBs	Perchlorates, Nitrates, Phosphorus	Nitroaro-matic, TNT, Explosives
10MW-1 (10SB-1)	Northeast of Building 10	Soil and groundwater	✓	✓	✓	✓		
10SB-2	South of Building 10	Soil	✓	✓		✓		
10SB-3	East of Building 10	Soil	✓	✓				
10SB-4	North of Building 10	Soil	✓	✓				
10SB-5 (9SB-1)	Southeast of Building 10	Soil	✓	✓				
10SB-1A	Sludge pit	Soil	✓	✓		✓	✓	✓

12.0 PHASE II ENVIRONMENTAL BASELINE SURVEY INVESTIGATIVE RESULTS

This section describes sitewide and building-specific Phase II EBS investigative results. Analytical results have been compared to the MDNR "Cleanup Levels for Missouri (CALM)" (MDNR 1998). Specifically, soil analytical results were compared to the cleanup levels specified for the leaching to groundwater pathway and two CALM scenarios, Scenario A and Scenario C. Leaching to groundwater pathway cleanup levels represent default, non-site-specific concentrations at which contaminants cannot leach from soil into groundwater. Scenario A represents residential use of a property, and Scenario C represents industrial use of a property. The groundwater analytical results were compared to CALM groundwater target concentration criteria. The air sample analytical results for PCBs for Building 3 were compared to U.S. EPA Region 9 criteria.

12.1 SITEWIDE INVESTIGATIVE RESULTS

This section discusses the lithologic soil boring, groundwater, land survey, and ACM survey results of the Phase II EBS investigation.

12.1.1 Lithological Soil Boring Results

A total of nine continuously sampled soil borings (SWMW-1 through SWMW-7, 2MW-1, and 10MW-1) were advanced at SLAAP using a truck-mounted drill rig and split-spoon samplers. The soil boring locations are depicted in Figure 12-1. The soil borings were advanced until drill refusal. Upon soil boring completion, the soil borings were converted into monitoring wells. Soil borings advanced at the SLAAP installation indicate that beneath the surficial fill material, the subsurface soils generally consist of layers of clayey silt, chert gravel, silty clay, and weathered shale. The general lithology encountered in each boring is summarized below.

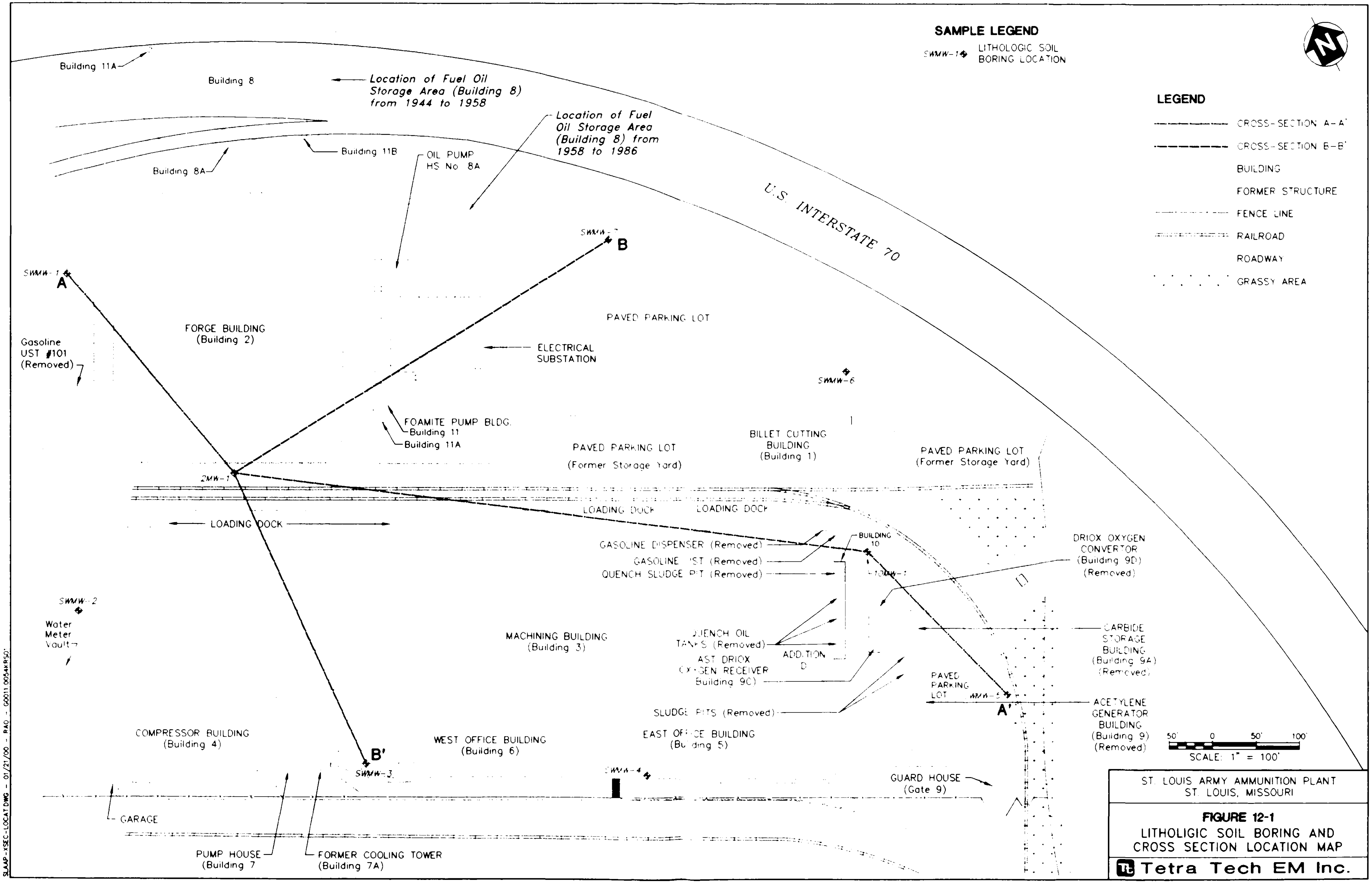

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FIGURE 12-1
LITHOLOGIC SOIL BORING AND CROSS SECTION LOCATION MAP

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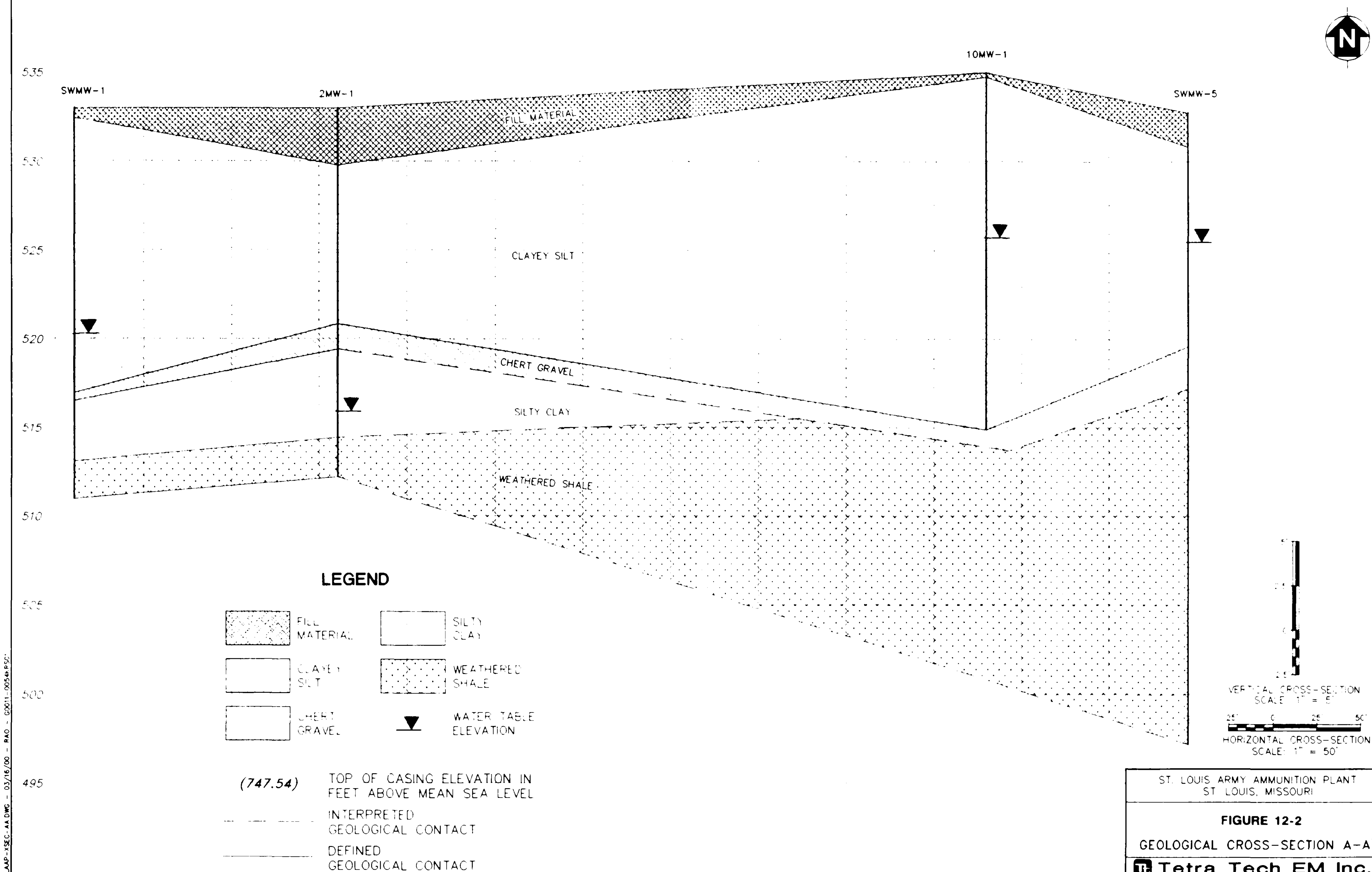
Boring Number	Fill (feet bgs)	Clayey Silt (feet bgs)	Chert Gravel (feet bgs)	Silty Clay (feet bgs)	Weathered Shale (feet bgs)
SWMW-1	0 - 0.5	0.5 - 16	16 - 16.5	16.5 - 20	20 - 33
SWMW-2	0 - 2	2 - 20.5	20.5 - 21	NE	21 - 24
SWMW-3	0 - 1	1 - 21.2	NE	NE	NE
SWMW-4	0 - 2	2 - 27.5	NE	27.5 - 28	NE
SWMW-5	0 - 2	2 - 26	26 - 28	NE	28 - 37.75
SWMW-6	0 - 1	1 - 16	16 - 18	18 - 18.5	18.5 - 19
SWMW-7	0 - 0.5	0.5 - 15.5	15.5 - 16.5	16.5 - 20	20 - 35
2MW-1	0 - 3	3 - 12	12 - 13	13 - 18	18 - 20
10MW-1	0 - 0.5	0.5 - 20	20	NE	NE
Note: NE = Not encountered					

Boring logs are included in Appendix H. Generalized geologic cross sections are shown in Figures 12-2 and 12-3. The clayey silt and silty clay lithology observed in the soil borings did not appear to be readily transmissive of groundwater. The chert gravel in the chert gravel layer was suspended in a massive clay matrix that does not readily allow groundwater movement and that was dry when encountered. Visual indications of groundwater were identified in siltier seams and in the clayey silt directly overlying the chert gravel layer.

12.1.2 Groundwater Results

Seven sitewide monitoring wells (SWMW-1 through SWMW-7) were installed along the SLAAP property boundary to collect sitewide groundwater data. Also, two monitoring wells (2MW-1 and 10MW-1) were installed to assess groundwater quality in areas downgradient of possible areas of environmental concern. The monitoring well locations are depicted in Figure 12-4. Groundwater flow and groundwater quality results are discussed below.

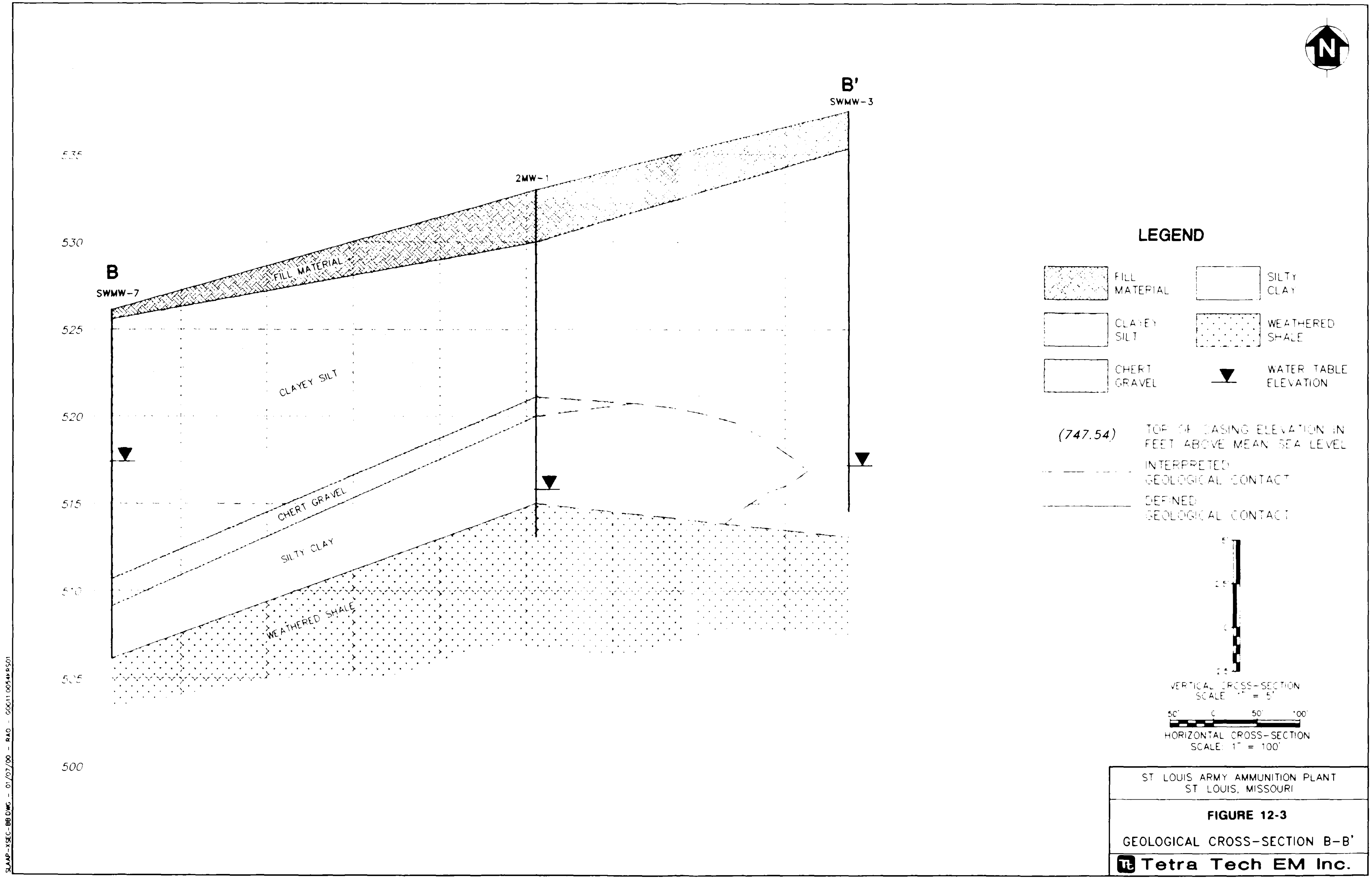


ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 12-2

GEOLOGICAL CROSS-SECTION A-A'

Tetra Tech EM Inc.



ST LOUIS ARMY AMMUNITION PLANT
ST LOUIS, MISSOURI

FIGURE 12-3

GEOLOGICAL CROSS-SECTION B-B'

Tetra Tech EM Inc.

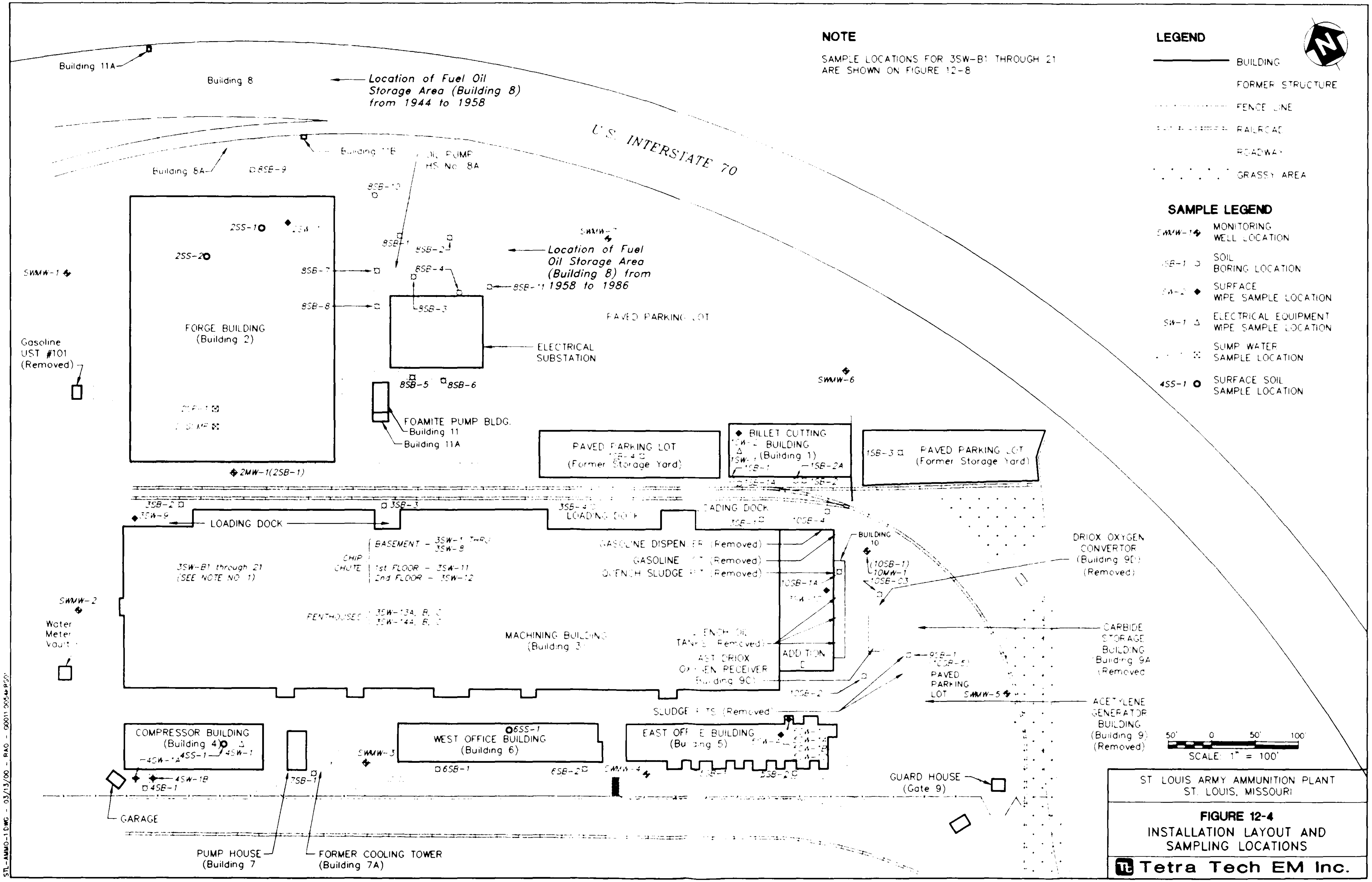


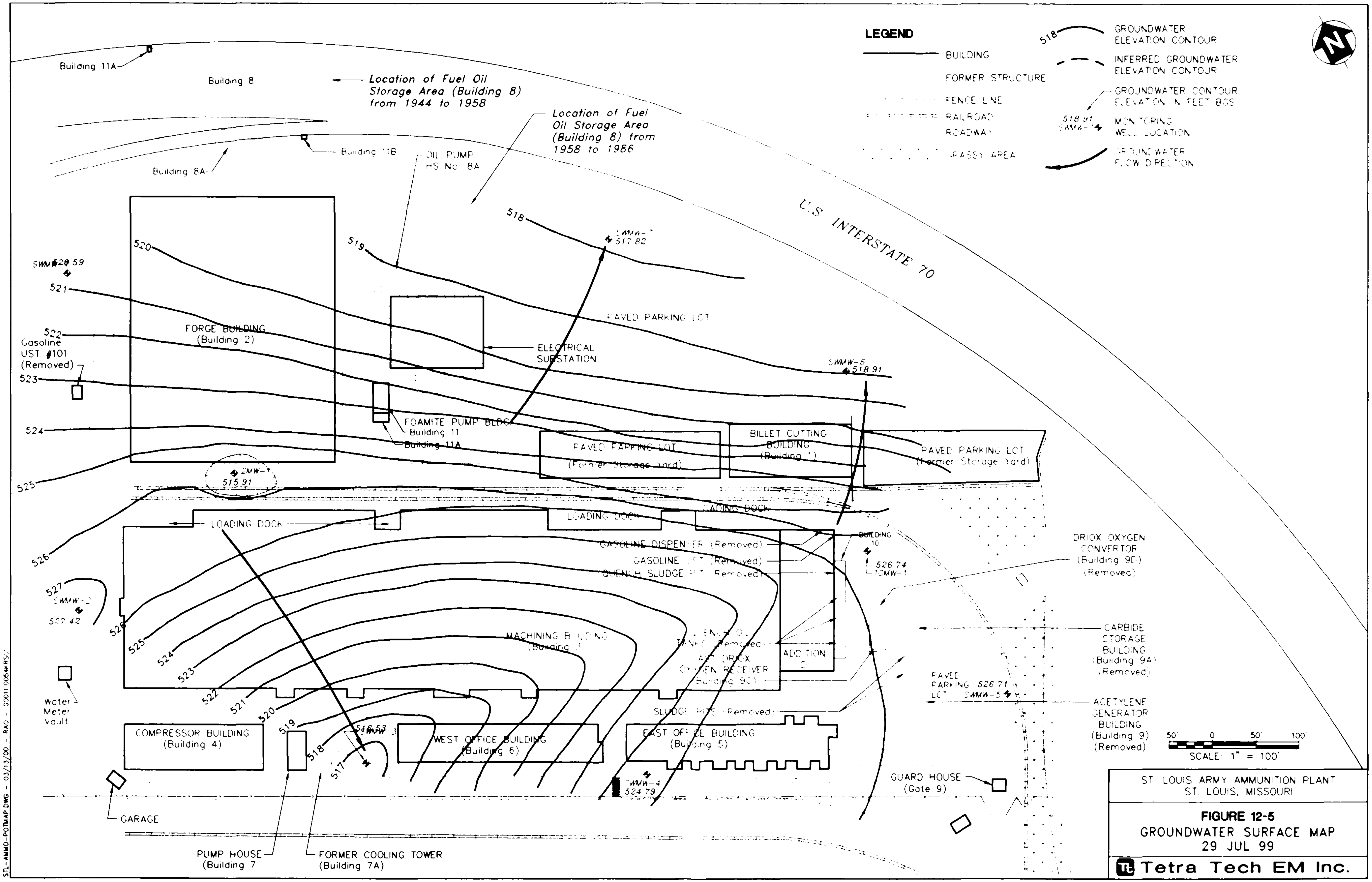
FIGURE 12-4
INSTALLATION LAYOUT AND SAMPLING LOCATIONS

12.1.2.1 Groundwater Flow Results

The depth to groundwater in the nine monitoring wells was measured on three different occasions (29 Jul, 2 Aug, and 17 Nov 99). The following table summarizes the depths to groundwater and groundwater elevations measured.

Monitoring Well Number	Top of Casing Elevation (feet amsl)	Depth to Groundwater (feet bgs)	Groundwater Elevation (feet amsl)
29 Jul 99			
SWMW-1	533.24	12.65	520.59
SWMW-2	535.1	7.68	527.42
SWMW-3	535.63	19.1	516.53
SWMW-4	536.19	11.4	524.79
SWMW-5	533.01	6.3	526.71
SWMW-6	526.91	7.95	518.96
SWMW-7	525.72	7.9	517.82
2MW-1	532.76	16.85	515.91
10MW-1	535.39	8.65	526.74
2 Aug 99			
SWMW-1	533.24	12.7	520.54
SWMW-2	535.1	7.6	527.5
SWMW-3	535.63	18.2	517.43
SWMW-4	536.19	12.7	523.49
SWMW-5	533.01	6.7	526.31
SWMW-6	526.91	8.36	518.55
SWMW-7	525.72	8.11	517.61
2MW-1	532.76	16.2	516.56
10MW-1	535.39	8.9	526.49
17 Nov 99			
SWMW-1	533.24	0	533.24
SWMW-2	535.1	6.01	529.09
SWMW-3	535.63	13.63	522
SWMW-4	536.19	13.36	522.83
SWMW-5	533.01	7.62	525.39
SWMW-6	526.91	8.42	518.49
SWMW-7	525.72	8.88	516.84
2MW-1	532.76	11.03	521.73
10MW-1	535.39	10.28	525.11

Note:
amsl = Above mean sea level
bgs = Below ground surface


LEGEND
BUILDING
FORMER STRUCTURE
FENCE LINE
RAILROAD
ROADWAY
GRASSY AREA
GROUNDWATER ELEVATION CONTOUR
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER CONTOUR ELEVATION IN FEET BGS
MONITORING WELL LOCATION
GROUNDWATER FLOW DIRECTION
U.S. INTERSTATE 70
Building 11A
Building 8
Location of Fuel Oil Storage Area (Building 8) from 1944 to 1958
Location of Fuel Oil Storage Area (Building 8) from 1958 to 1986
Building 8A
Building 11B
OIL PUMP HS No. 8A
FORGE BUILDING (Building 2)
ELECTRICAL SUBSTATION
PAVED PARKING LOT
FOAMITE PUMP BLDG Building 11
Building 11A
PAVED PARKING LOT (Former Storage Yard)
BILLET CUTTING BUILDING (Building 1)
Gasoline UST #101 (Removed)
SWMW-7 517.82
SWMW-6 518.91
2MW-1 515.91
SWMW-2 527.42
526.74 10MW-1
526.71 SWMW-5
SWMW-4 524.79
516.53 SWMW-3
LOADING DOCK
GASOLINE DISPENSER (Removed)
GASOLINE UST (Removed)
QUENCH SLUDGE PIT (Removed)
MACHINING BUILDING (Building 3)
ADDITION D
AIR DRIOX OXYGEN RECEIVER (Building 9C)
SLUDGE PITS (Removed)
BUILDING 10
DRIOX OXYGEN CONVERTOR (Building 9D) (Removed)
CARBIDE STORAGE BUILDING (Building 9A) (Removed)
ACETYLENE GENERATOR BUILDING (Building 9) (Removed)
PAVED PARKING LOT
WEST OFFICE BUILDING (Building 6)
EAST OFFICE BUILDING (Building 5)
COMPRESSOR BUILDING (Building 4)
Water Meter Vault
GARAGE
PUMP HOUSE (Building 7)
FORMER COOLING TOWER (Building 7A)
GUARD HOUSE (Gate 9)
518
519
520
521
522
523
524
525
526
527
517
SCALE 1" = 100'
ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI
FIGURE 12-5
GROUNDWATER SURFACE MAP
29 JUL 99
Tetra Tech EM Inc.
STL-AMMO-POTMAP.DWG - 03/13/00 - RAO - G0011.0064

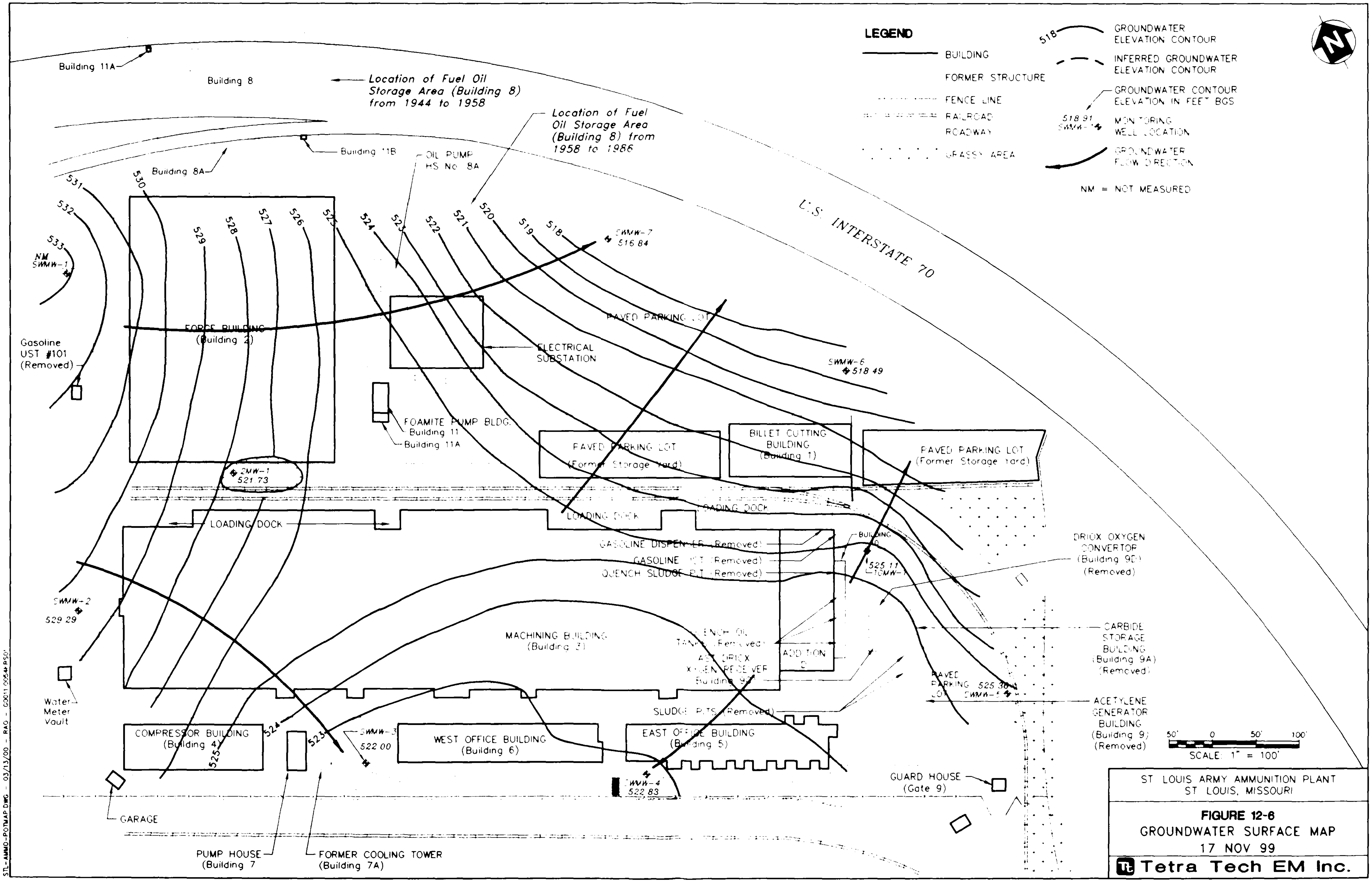
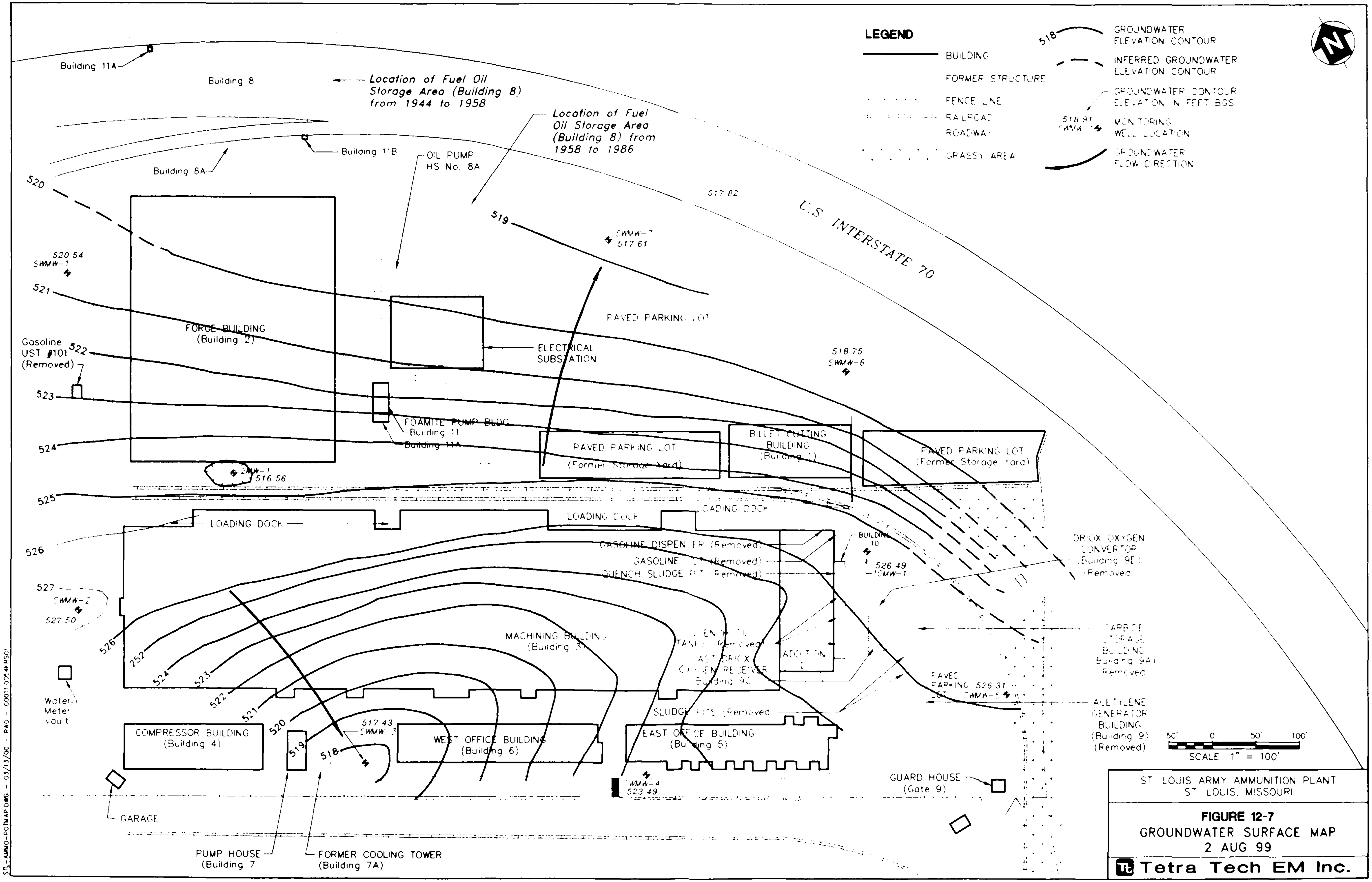


FIGURE 12-6
GROUNDWATER SURFACE MAP
17 NOV 99
Tetra Tech EM Inc.



ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 12-7
GROUNDWATER SURFACE MAP
2 AUG 99

Tetra Tech EM Inc.

Groundwater flow maps for the 29 Jul, 2 Aug, and 17 Nov data sets are shown in Figures 12-5, 12-6, and 12-7, respectively. The groundwater elevations indicate that groundwater flows onto the SLAAP installation from the west. The groundwater surface then appears to form a "saddle" under Building 3. This saddle results in radial flow of groundwater from the high groundwater elevation under Building 3 to the lower groundwater elevations north, east, and south of Building 3. Because SLAAP is at a higher elevation than I-70 located north and east of the installation and the property located south of the installation, it appears that the groundwater flow is following the regional topography. Groundwater sample collection pumping rates were recorded, and the groundwater flow through the screened saturated units underlying SLAAP is too slow to maintain a constant flow of 0.5 liter per minute. Therefore, it appears that these saturated units cannot be used as sources of potable groundwater.

12.1.2.2 Groundwater Quality Results

The nine monitoring wells were sampled during the weeks of 2 Aug and 15 Nov 99. Groundwater analytical results for samples collected from the seven sitewide monitoring wells are summarized below. Analytical results are included in Appendix I. Groundwater samples collected from monitoring wells 2MW-1 and 10MW-1 are discussed in Sections 12.2.2 and 12.2.10, respectively.

SITEWIDE SVOC AND METAL ANALYTICAL RESULTS FOR GROUNDWATER

Analytical Parameter	Monitoring Well Numbers							Groundwater Target Concentration
	SWMW-1	SWMW-2	SWMW-3	SWMW-4	SWMW-5	SWMW-6	SWMW-7	
Antimony	ND	ND	ND	ND	ND	ND	ND	6
Cadmium	ND	ND	ND	ND	ND	ND	ND	5
Chromium	2.3	0.88	2.4	1.1	8.83	1.3	ND	100
Copper	ND	ND	ND	1.2	ND	ND	1.5	1,000
Lead	ND	ND	ND	ND	ND	ND	ND	100
Selenium	ND	ND	ND	ND	ND	ND	ND	50
Thallium	ND	ND	ND	ND	ND	ND	ND	2
Zinc	5.6	6.1	6.3	24.5	16.5	22	8.9	2,000
Bis(2-ethylhexyl) phthalate	ND	ND	33	13	ND	ND	11	6
Di-n-butyl phthalate	ND	ND	ND	ND	ND	ND	9	NL
Phosphorus	NA	ND	160	ND	NA	NA	NA	NL
Nitrate	NA	1,000	760	22,800	NA	NA	NA	NL

SITEWIDE SVOC AND METAL ANALYTICAL RESULTS FOR GROUNDWATER								
Analytical Parameter	**Monitoring Well Numbers**							**Groundwater Target Concentration**
	SWMW-1	**SWMW-2**	**SWMW-3**	**SWMW-4**	**SWMW-5**	**SWMW-6**	**SWMW-7**	
Notes: NA = Not analyzed ND = Not detected NL = Not listed in CALM Phthalate detections were identified for some wells sampled during the 3 Aug sampling event, but no phthalates were detected in the same wells during the 17 Nov event. The equipment blank collected during the 3 Aug sampling event contained 81 micrograms per liter (μg/L) of bis(2-ethylhexyl)phthalate. All values are presented in μg/L.								

Groundwater samples collected from the sitewide monitoring wells did not contain detectable concentrations of VOCs or PCBs. The total metal concentrations detected do not exceed CALM groundwater target concentration criteria. Only bis(2-ethylhexyl)phthalate was detected at concentrations that exceed the CALM groundwater target concentration. Groundwater samples collected from SWMW-3, SWMW-4, and SWMW-7 contained bis(2-ethylhexyl)phthalate concentrations ranging from 11 to 33 μg/L. These concentrations exceed the CALM groundwater target concentration of 6 μg/L. However, the equipment blank collected during the 3 Aug sampling event contained 81 μg/L of bis(2-ethylhexyl)phthalate, indicating that the source of the phthalate detected in the groundwater samples was the plastic tubing used during sample collection. Also, because SLAAP was in operation before plastic, the major source for phthalates, was widely used, no source of phthalates is present at SLAAP. Therefore, the detections of the phthalates are likely due to the sampling equipment and are not reflective of groundwater quality.

12.1.3 Land Survey Results

The land survey results are included in Appendix J. Data from the land survey was used to create geologic cross sections and groundwater contour maps for SLAAP.

12.1.4 Asbestos-Containing Material Survey Results

The ACM survey indicated that ACM is present in Buildings 1, 2, 3, 4, 5, and 6. The ACM survey repot is included in Appendix K.

12.2 BUILDING-SPECIFIC INVESTIGATIVE RESULTS

This section summarizes the building-specific results of the Phase II EBS investigation. Analytical results are presented in Appendix I.

12.2.1 Building 1 Results

Soil borings 1SB-1 through 1SB-4, 1SB-1A, and 1SB-2A were advanced and sampled near Building 1. Additionally, two wipe samples (1SW-1 and 1SW-2) were collected from Building 1. Soil borings 1SB-1 and 1SB-2 were completed during the first phase of field activities. Soil borings 1SB-1A and 1SB-2A were completed within 1 foot of the original 1SB-1 and 1SB-2 during the second phase of field activities. Soil borings 1SB-1 and 1SB-2 were advanced to characterize soil in the vicinity of pits that connect Building 1 to the sewer system. Soil borings 1SB-3 and 1SB-4 were advanced to assess the soil in the former steel billet storage areas. The wipe samples were collected to determine whether the oil stain beneath the electrical equipment and oil stains on the floor of the building contained PCBs. Building 1 sampling locations are depicted in Figure 12-4. Building 1 soil boring and headspace analysis results are summarized below.

BUILDING 1 SOIL BORING RESULTS						
Boring Number	**Total Depth (feet bgs)**	**Fill (feet bgs)**	**Clayey Silt (feet bgs)**	**Silty Clay (feet bgs)**	**Depth to Groundwater (feet bgs)**	**Sampled Interval and Analytical Parameters**
1SB-1(1A)	12	0-9	9-12	NE	NE	9 to 11 feet bgs for SVOCs, metals, PCBs 9.5 feet bgs for VOCs
1SB-2(2A)	12	0-5	5-8	8-12	11	6 to 8 feet bgs for SVOCs, metals, PCBs 7 feet bgs for VOCs
1SB-3	4	0-4	NE	NE	NE	2 to 3 feet bgs for metals
1SB-4	4	0-1	NE	1-4	NE	1 to 4 feet bgs for metals
Note: NE = Not encountered						

BUILDING 1 HEADSPACE ANALYSIS RESULTS						
Boring Number	**2 feet bgs**	**4 feet bgs**	**6 feet bgs**	**8 feet bgs**	**10 feet bgs**	**11 feet bgs**
1SB-1(1A)	25.98	27.21	26.72	26.93	28.21	NS
1SB-2(2A)	NM	12.32 (3 feet)	16.89 (5 feet)	19.37 (7 feet)	15.97 (9 feet)	14.28
Notes: NS = Not sampled NM = Not measured All values are presented in ppm.						

Building 1 soil sample and wipe sample analytical results are summarized below.

BUILDING 1 SOIL SAMPLE ANALYTICAL RESULTS FOR METALS							
	Sample Numbers				CALM		
					Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
Analytical Parameter	1SB-1A, 9-11	1SB-2A, 6-8	1SB-3, 2-3	1SB-4 1-4	Scenario A	Scenario C	
Antimony	ND	ND	11.5	ND	3.7	12	5.3
Cadmium	ND	1.85	ND	ND	87	300	11
Chromium	15.8	43.6	285	19.2	1,300	2,700	38
Copper	13.0	86.1	430	29	3,100	4,700	NL
Lead	14.9	1,450	2,120	104	260	660	NL
Selenium	0.701	1.46	3.9	1.44	300	970	4.37
Thallium	ND	ND	ND	ND	17	61	29.1
Zinc	4.47	1,260	1,600	112	38,000	420,000	73,600

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 1 WIPE SAMPLE ANALYTICAL RESULTS			
Sample Number	Sampling Location	Total PCBs	CALM Criterion
1SW-1	Oil stain under electrical equipment	0.0219	0.010
1SW-2	Miscellaneous oil stain	ND	0.010

Notes:
ND = Not detected
All values are presented in mg/100 square centimeters (cm^2).

Soil samples collected from Building 1 did not contain concentrations of VOCs, SVOCs, or PCBs exceeding CALM criteria. Soil samples collected from soil borings 1SB-2A and 1SB-3 contained elevated concentrations of lead that exceeded CALM Scenario A and C criteria. Also, the chromium concentrations in soil samples collected from 1SB-2A and 1SB-3 exceeded the CALM leaching to groundwater pathway criterion. The soil sample collected from 1SB-3 also contained an antimony concentration exceeding the CALM leaching to groundwater pathway criterion. The wipe sample collected directly under the electrical equipment contained a total PCB concentration exceeding the

CALM criterion of 0.010 mg/100 cm^2 by 0.0119 mg. This PCB contamination appears to be from the electrical equipment, as the sample collected from the miscellaneous oil stain did not contain PCBs.

12.2.2 Building 2 Results

One soil boring and one monitoring well were completed and sampled at Building 2. Also, two sump water samples, one wipe sample, and two surface soil samples were collected. The soil boring (2SB-1) and monitoring well (2MW-1) were completed to assess subsurface media near the end of the fuel oil pipeline system. The sump water samples (2SP-1 and 2Sump) were collected to assess the quality of water in sumps present in Building 2; one sump was sampled on two occasions for analysis for different parameters. The wipe sample (2SW-1) was collected to assess the oil stain in the northeast corner of the building near the former location of a rotary furnace. Two surface soil samples (2SS-1 and 2SS-2) were collected to assess soil quality in areas near the former rotary furnaces. Building 2 sampling locations are depicted in Figure 12-4. Building 2 soil boring and headspace analysis results are summarized below.

BUILDING 2 SOIL BORING RESULTS						
Boring Number	**Total Depth (feet bgs)**	**Fill (feet bgs)**	**Clayey Silt (feet bgs)**	**Silty Clay (feet bgs)**	**Depth to Groundwater (feet bgs)**	**Sampled Interval and Analytical Parameters**
2SB-1	20	0-3	3-13	13-20	NE	1 to 2 and 2 to 3 feet bgs for SVOCS and PCBs 1.5 and 2.5 feet bgs for VOCs
Note: NE = Not encountered						

BUILDING 2 HEADSPACE ANALYSIS RESULTS										
Boring Number	**1 foot bgs**	**3 feet bgs**	**5 feet bgs**	**7 feet bgs**	**9 feet bgs**	**11 feet bgs**	**13 feet bgs**	**15 feet bgs**	**17 feet bgs**	**19 feet bgs**
2SB-1	NM	11	8	8	7.5	6	5.5	4	1	0
Notes: NM = Not measured All values are presented in ppm.										

Building 2 soil, groundwater, and sump water sample analytical results are summarized in the tables below.

BUILDING 2 SOIL SAMPLE ANALYTICAL RESULTS FOR METALS AND PCBs					
Analytical Parameter	Sample Numbers		CALM		
			Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	2SS-1	2SS-2	Scenario A	Scenario C	
Antimony	ND	ND	3.7	12	5.3
Cadmium	1.85	ND	87	300	11
Chromium	43.6	131	1,300	2,700	38
Copper	86.1	1,210	1,100	4,700	NL
Lead	1,450	267	260	660	NL
Selenium	1.46	3.81	300	970	4.37
Thallium	ND	ND	17	61	29.1
Zinc	1,260	386	38,000	420,000	73,600
PCB	0.51	NA	0.6	2.5	NL

Notes:
NA = Not analyzed for
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 2 (2MW-1) GROUNDWATER SAMPLE ANALYTICAL RESULTS			
Analytical Parameter	3 Aug 99	17 Nov 99	Groundwater Target Concentration
Methylene chloride	ND	0.98	2
1,1-Dichloroethene	61	56	7
1,1-Dichloroethane	22	20	NL
Chloroform	22	18	864
1,1,1-trichloroethane	4.3	3.8	200
Carbon tetrachloride	3.1	3.4	5
1,3-Dichlorobenzene	ND	2.4	NL
Di-n-butylphthalate	11	ND	NL
Bis(2-ethylhexyl)phthalate	220	1.9	6
Chromium	NA	11.1	100
Zinc	NA	118	2,000

Notes:
NA = Not analyzed for
ND = Not detected
NL = Not listed in CALM
All values are presented in μg/L.

BUILDING 2 SUMP WATER SAMPLE ANALYTICAL RESULTS		
Parameter	**2SP-1 and 2Sump**	**Groundwater Target Concentration**
Antimony	9.0	6
Cadmium	1.4	5
Chromium	10.3	100
Copper	85.6	1,000
Lead	131	100
Selenium	ND	50
Thallium	ND	2
Zinc	347	2,000
1,1-Dichloroethane	10	NL
1,1,1-Trichloroethane	1.6	200
Notes: ND = Not detected NL = Not listed in CALM Samples 2SP-1 and 2Sump were collected from one sump during different sampling events. All values are presented in μg/L.		

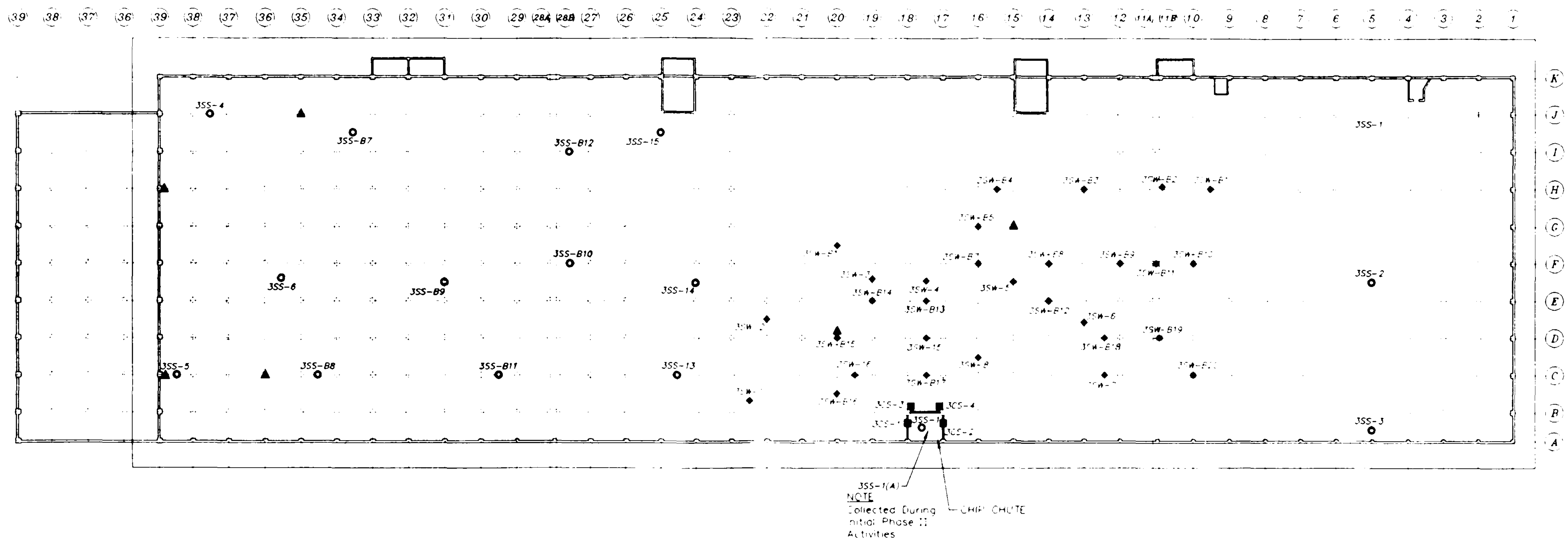
The two surface soil samples collected from Building 2 contained concentrations of lead exceeding the CALM Scenario A criterion and concentrations of chromium exceeding the CALM leaching to groundwater pathway criterion. The groundwater samples collected from 2MW-1 did not contain concentrations of PCBs or metals exceeding CALM groundwater target criteria. The groundwater samples collected from 2MW-1 did contain concentrations of 1,1-dichloroethene exceeding the CALM groundwater target concentration. The groundwater sample collected during the 3 Aug sampling event contained 220 μg/L of bis(2-ethylhexyl)phthalate; this sample was collected with the same equipment that caused the 81-μg/L phthalate detection in the equipment blank. The well was later resampled for SVOC analysis using a different type of tubing. The groundwater sample collected during the 17 Nov sampling event did not contain a phthalate concentration exceeding a CALM groundwater target concentration. This result further indicates that the bis(2-ethylhexyl)phthalate detection in the sample collected on 3 Aug was caused by the sampling equipment. The wipe sample (2SW-1) did not contain a PCB concentration exceeding CALM criterion. The water sample collected from the sump contained lead and antimony concentrations exceeding CALM groundwater target concentrations.

12.2.3 Building 3 Results

Four soil borings (3SB-1 through 3SB-4) were advanced and sampled at Building 3. Also, 44 wipe samples, 17 concrete core samples, 6 air samples, 2 water samples from a sump and floor drain, and 16 surface soil samples were collected at Building 3.

The soil borings were completed to assess soils at the remote quench oil fill and at the loading docks. The wipe samples were collected to assess possible PCB contamination in the basement, on the first and second floors near the chip chute, and in the elevator penthouse. Concrete core samples were collected to assess possible PCB contamination in the walls of the former chip chute and in structural components of the basement. The air samples were collected to assess ambient air quality in the basement. The floor drain samples were collected to assess the quality of water in a floor drain in the basement and in the floor drain that serviced the solvent room. The surface soil samples were collected to assess soil quality throughout the basement. Building 3 outdoor sampling locations are shown in Figure 12-4; Building 3 basement sampling locations are depicted in Figure 12-8. Building 3 soil boring and headspace analysis results are summarized below.

BUILDING 3 SOIL BORING RESULTS						
Boring Number	**Total Depth (feet bgs)**	**Fill (feet bgs)**	**Clayey Silt (feet bgs)**	**Silty Clay (feet bgs)**	**Depth to Groundwater (feet bgs)**	**Sampled Interval and Analytical Parameters**
3SB-1	8	0-5	NE	5-8	7.5	6 to 8 feet bgs for SVOCs and metals 5 feet bgs for VOCs
3SB-2	2	0-4	4-8	8-20	8.5	8 to 10 feet bgs for SVOCs, metals, and PCBs 9 feet bgs for VOCs (analytical results pending)
3SB-3	14	0-8	8-14	NE	8.0	2 to 4 feet bgs for SVOCs, metals, and PCBs 10 to 12 feet bgs for SVOCs, metals, and PCBs 3 and 11 feet bgs for VOCs
3SB-4	20	0-8	8-20	NE	7.0	0 to 2 feet bgs for SVOCs, metals, and PCBs 1 foot bgs for VOCs
Note: NE = Not encountered						



LEGEND

3SS-1 ○ SURFACE SOIL SAMPLE LOCATION

◆ SURFACE WIPE SAMPLE LOCATION

3SC-1 ■ CONCRETE CORE SAMPLE

▲ AIR SAMPLE LOCATION

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ST LOUIS, MISSOURI

FIGURE 12-8
BUILDING NO. 3 – BASEMENT SAMPLING LOCATIONS

Tetra Tech EM Inc.

SLAAP-BLDG3 SAMPS.DWG – 03/13/00 PAG 5001.0066EEFM0C

BUILDING 3 HEADSPACE ANALYSIS RESULTS										
Boring Number	1 foot bgs	3 feet bgs	5 feet bgs	7 feet bgs	9 feet bgs	11 feet bgs	13 feet bgs	15 feet bgs	17 feet bgs	19 feet bgs
3SB-1	NM	31.65	34.61	29.87	NS	NS	NS	NS	NS	NS
3SB-2	NM	0	0	0	55	53	44	44	0	0
3SB-3	0	>2,000	>2,000	>2,000	>2,000	>2,000	0.9	0	0	0
3SB-4	0	0	0	0	0	0	0	0	0	0

Notes:
NM = Not measured
NS = Not sampled
All values are presented in ppm.

Building 3 surface soil, wipe, concrete core, floor drain, and air sample analytical results are summarized below.

BUILDING 3 BASEMENT SURFACE SOIL SAMPLE ANALYTICAL RESULTS FOR PCB AND PESTICIDES						
Sample Number	Interval (feet bgs)	Column Location	Total PCBs	DDD	DDE	DDT
3SS-1A	0-0.5	Chip chute	15	NA	NA	NA
3SS-1	0-0.5	J5 and I5	0.9	NA	NA	NA
3SS-2	0-0.5	E5 and F5	ND	ND	ND	ND
3SS-2D	0-0.5	E5 and F5	0.079	ND	ND	ND
3SS-3	0-0.5	A5 and B5	ND	NA	NA	NA
3SS-4	0-0.5	J37 and J38	ND	NA	NA	NA
3SS-5	0-0.5	C38 and C39	0.16	0.0056	0.015	0.035
3SS-6	0-0.5	E35 and F36	ND	NA	NA	NA
3SS-6	1-1.5	E35 and F36	ND	NA	NA	NA
3SS-B7(7B)	0-0.5	I33 and J34	ND	ND	0.43	1.6
3SS-B7	1-1.5	I33 and J34	ND	NA	NA	NA
3SS-B8	1-1.5	C35 and C34	ND	NA	NA	NA
3SS-B9	0-0.5	E31 and F31	ND	NA	NA	NA
3SS-B9	1-1.5	E31 and F31	ND	NA	NA	NA
3SS-B10	0-0.5	F28 and F27	ND	NA	NA	NA
3SS-B10	1-1.5	I28 and J28	ND	NA	NA	NA
3SS-B11	0-0.5	C29 and C30	ND	NA	NA	NA
3SS-B12	0-0.5	I27 and I28	ND	ND	ND	0.14
3SS-12D	0-0.5	I27 and I28	ND	ND	ND	0.074
3SS-13	0-0.5	C24 and C25	ND	NA	NA	NA
3SS-14	0-0.5	E24 and F24	0.17	NA	NA	NA

BUILDING 3 BASEMENT SURFACE SOIL SAMPLE ANALYTICAL RESULTS FOR PCB AND PESTICIDES						
Sample Number	Interval (feet bgs)	Column Location	Total PCBs	DDD	DDE	DDT
3SS-15	0-0.5	J25 and I25	ND	NA	NA	NA
3SS-16	0-0.5	E40 and F40	ND	ND	ND	ND
AP-1	0-0.5	F41 and G42	ND	NA	NA	NA

Notes:
3SS-1A = Collected during initial Phase II activities
NA = Not analyzed for
ND = Not detected
CALM criteria for ingestion/dermal contact: PCB = 0.6 mg/kg DDE = 4.8 mg/kg
DDD = 6.8 mg/kg DDT = 10 mg/kg
All values are presented in mg/kg.

BUILDING 3 BASEMENT SURFACE SOIL SAMPLE ANALYTICAL RESULTS FOR SVOCs AND VOCs				
		CALM		
	Sample Number	Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
Analytical Parameter	AP-1, 0-0.5	Scenario A	Scenario C	
Anthracene	0.06	21,000	69,000	16,700
Chrysene	0.95	36	143	470
Fluoranthene	0.54	600	1,900	4,480
Phenanthrene	0.17	NL	NL	NL
Pyrene	0.54	2,100	6,900	4,480
Bis(2-ethylhexyl)phthalate	1.5	200	200	70
Bromothene	0.0039	NL	NL	NL
Methylene chloride	0.014	51	145	0.021
2-Butanone	0.0056	NL	NL	NL

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 3 WIPE SAMPLE ANALYTICAL RESULTS FOR TOTAL PCBs			
Sample Number	Floor	Column Location	Total PCBs
3SW-1	Basement	B23 and C22	0.069
3SW-2	Basement	D22 and E-23	0.064
3SW-3	Basement	E19 and F19	0.030
3SW-3B	Basement	E19 and F19	0.13
3SW-4	Basement	E18 and F17	0.018

BUILDING 3 WIPE SAMPLE ANALYTICAL RESULTS FOR TOTAL PCBs			
Sample Number	**Floor**	**Column Location**	**Total PCBs**
3SW-5	Basement	E15	0.031
3SW-6	Basement	D13 and E13	0.110
3SW-7	Basement	C12 and C13	0.490
3SW-8	Basement	D16 and C16	0.046
3SW-9	Basement	Electric vault	0.0157
3SW-10	Basement	Quench oil tank stain	0.048
3SW-11	First	Chip chute	0.089
3SW-12	Second	Chip chute	0.014
3SW-13	Penthouse	NA	0.179
3SW-14	Penthouse	NA	0.12
13SW-13A	Penthouse	NA	0.0021
13SW-13B	Penthouse	NA	0.054
3SW-13C	Penthouse	NA	ND
3SW-14A	Penthouse	NA	LA
3SW-14B	Penthouse	NA	0.04
3SW-14C	Penthouse	NA	0.06
3SW-15	Basement	D18 and D17	0.018
3SW-16	Basement	C20 and C19	0.071
3SW-B1	Basement	H9 and H10	Analytical results pending
3SW-B2	Basement	H11	0.230
3SW-B3	Basement	H13	Analytical results pending
3SW-B4	Basement	H15 and H16	0.36
3SW-B5	Basement	G16	2.9
3SW-B6	Basement	F20 and G20	0.16
3SW-B7	Basement	F16	1.3
3SW-B8	Basement	F14	0.2
3SW-B9	Basement	F12	ND
3SW-B10	Basement	F10	ND
3SW-B11	Basement	F11	0.11
3SW-B12	Basement	E14	2.0
3SW-B13	Basement	E17 and E18	0.67
3SW-B14	Basement	E19	ND
3SW-B15	Basement	D20	ND
3SW-B16	Basement	C20 and B20	0.55

BUILDING 3 WIPE SAMPLE ANALYTICAL RESULTS FOR TOTAL PCBs			
Sample Number	**Floor**	**Column Location**	**Total PCBs**
3SW-B17	Basement	C17 and C18	ND
3SW-B18	Basement	D12 and D13	1.5
3SW-B19	Basement	D11	ND
3SW-B20	Basement	C10	0.098
3SW-B2-21	Basement	Blank	ND

Notes:
NA = Not applicable
ND = Not detected
CALM criterion for wipe samples: PCB = 0.010 mg/100 cm^2
All values are presented in mg/100 cm^2.
LA = Laboratory accident and not analyzed

BUILDING 3 CONCRETE CORE SAMPLE ANALYTICAL RESULTS FOR TOTAL PCBs			
Sample Number	**Floor**	**Location**	**Total PCBs**
3CS-1	Basement	Chip chute	0.36
3CS-2	Basement	Chip chute	25.0
3CS-3	Basement	Chip chute	74.0
3CS-4	Basement	Chip chute	2.8
3CS-5	Basement	E19	7.8
3CS-6	Basement	D23	6.7
3CS-7	Basement	K18	0.76
3CS-7D	Basement	K18	0.44
3CS-11	First	Chip chute	100
3CS-12	First	Chip chute	270
3CS-13	First	Chip chute	0.97
3CS-14	First	Chip chute	51
3CS-21	Second	Chip chute	0.7
3CS-22	Second	Chip chute	5.2
3CS-23	Second	Chip chute	0.16
3CS-24	Second	Chip chute	0.82
3CS-24D	Second	Chip chute	0.72

Note:
All values are presented in mg.
CALM criterion for destructive core samples: PCB = 10 milligram

BUILDING 3 WATER SAMPLE ANALYTICAL RESULTS			
Analytical Parameter	**3N Sump**	**3N Drain**	**Groundwater Target Concentration**
Cadmium	ND	1.0	100
Chromium	3.2	ND	100
Copper	11.6	12.4	1,000
Lead	1.8	8.7	15
Selenium	2.8	ND	50
Zinc	44.6	29.6	2,000
Bis(2-ethylhexyl)phthalate	4.1	NA	6
PCBs	ND	5.0	0.5

Notes:
NA = Not analyzed
ND = Not detected
All values are presented in μg/L.

BUILDING 3 AIR SAMPLE ANALYTICAL RESULTS		
Pump Number	**5835**	**5842**
Location	**Column J35**	**Column J35**
Air flow rate (liters per minute)	2.0	2.0
Air sample collection duration (minutes)	468	468
Total volume of air sampled (m^3)	0.936	0.936
Mass detected in sample media (μg)	0.12	0.11
Calculated ambient air DDE concentration ($\mu g/m^3$)	0.128	0.128
U.S. EPA Region 9 PRG ($\mu g/m^3$)	0.02	0.02

Notes:
m^3 = Cubic meter
PRG = Preliminary remediation goal

BUILDING 3 SOIL BORING ANALYTICAL RESULTS FOR SVOCs AND PCBs						
				CALM		
	Sample Numbers			**Ingestion/Dermal Contact Inhalation Pathway**		**Leaching to Groundwater Pathway**
Analytical Parameter	**3SB-1, 4-6**	**3SB-3, 2-4**	**3SB-4, 0-2**	**Scenario A**	**Scenario C**	
Anthracene	ND	0.046	0.072	21,000	69,000	16,700
Benzo(a)anthracene	ND	1.9	ND	1.1	4.2	4.7
Benzo(a)pyrene	ND	2.1	ND	0.16	0.63	130
Benzo(b)fluoranthene	ND	2.3	0.19	0.94	3.7	15
Benzo(k)fluoranthene	ND	1.8	0.50	8	32	150

Analytical Parameter	Sample Numbers			CALM		
				Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	3SB-1, 4-6	3SB-3, 2-4	3SB-4, 0-2	Scenario A	Scenario C	
Chrysene	ND	2.4	0.78	36	143	470
Fluoranthene	ND	4.2	ND	600	1,900	4,480
Indeno(1,2,3-cd)pyrene	ND	2.3	ND	2.9	11	41
Phenanthrene	ND	2.2	0.4	NL	NL	NL
Pyrene	ND	3.9	0.67	2,100	6,900	4,480
Benzo(g,h,i)perylene	ND	2.8	ND	NL	NL	NL
PCB	ND	830	17	0.6	2.5	NL
1,2,4-Tetrachlorobenzene	ND	10.0	ND	280	910	76

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 3 SOIL BORING ANALYTICAL RESULTS FOR VOCs						
Analytical Parameter	Sample Numbers			CALM		
				Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	3SB-1, 5	3SB-3, 3	3SB-4, 2.7	Scenario A	Scenario C	
Acetone	ND	0.015	0.043	2,700	8,660	14
Benzene	ND	ND	0.0062	7.6	16	0.057
2-Butanone	ND	ND	0.0072	NL	NL	NL
Ethylbenzene	ND	ND	0.0042	1,460	1,460	55
Chloroform	ND	0.0017	ND	46	109	2.2
1,1,1-Trichloroethane	ND	0.0016	ND	37	52	0.097
Trichloroethene	ND	ND	ND	37	52	0.097
Carbon disulfide	ND	ND	0.028	12	21	52
Toluene	ND	0.0018	0.014	890	890	8.13
Total xylenes	ND	ND	0.011	12	21	52

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

Wipe samples collected from the concrete portion of the basement, the transformer vault, the first- and second-floor chip chute areas, and the elevator penthouse contained PCB concentrations exceeding the CALM criterion of 0.010 mg/100 cm^2. In the elevator penthouse and transformer vault, the PCB

contamination appears to be confined to spilled oil. PCB contamination detected in the concrete portion of the basement appears to be random and confined to areas where soluble oil piping protrudes from the first floor into the basement through holes in the ceiling. Because the wipe samples collected from the first- and second-floor chip chute areas contained PCB concentrations exceeding the CALM criterion, it appears that PCBs have migrated through the finished floor.

Concrete core samples collected from the chip chute areas in the basement and on the first floor contained PCB concentrations exceeding the CALM criterion of 10 mg. Surface soil samples collected from the basement floor east and west of the concrete portion and from the quench oil-stained soil of the basement did not contain concentrations of PCBs, pesticides, or metals exceeding CALM criteria. Soil samples contained detectible pesticide concentrations.

Water samples collected from the sump in the basement and the drain trap contained detectable concentrations of metals; however, these concentrations do not exceed CALM groundwater target concentrations. The water sample collected from the north drain trap contained 5 $\mu g/L$ of PCBs, which exceeds the CALM groundwater target concentration and the City of St. Louis sewer discharge limit.

Six air samples were collected in the Building 3 basement and analyzed for PCBs and pesticides. One air sample and one replicate air sample collected from the east side of the basement contained DDE concentrations that exceed U.S. EPA Region 9 PRGs for unrestricted use.

The soil sample collected from soil boring 3SB-3 contained concentrations of polyaromatic hydrocarbons (PAH) and PCBs exceeding CALM criteria. The most likely source of this contamination is the chip chute conveyor system that was used to load railroad cars.

12.2.4 Building 4 Results

One soil boring (4SB-1) was completed and sampled at Building 4. Also, three wipe samples and one surface soil sample were collected. Soil boring 4SB-1 was advanced at the former transformer pad location at the southwest corner of the building. The wipe samples were collected to determine the PCB content of oil spilled from electrical equipment and from an oil stove. The surface soil sample was collected from a pit beneath the former air compressor to assess soil quality. Sampling locations are depicted in Figure 12-4. Soil boring results are summarized below.

BUILDING 4 SOIL BORING RESULTS						
Boring Number	Total Depth (feet bgs)	Fill (feet bgs)	Clayey Silt (feet bgs)	Silty Clay (feet bgs)	Depth to Groundwater (feet bgs)	Sampled Interval and Analytical Parameters
4SB-1	3	0-1	1-3	NE	NE	0 to 3 feet bgs for SVOCs and PCBs 1 foot bgs for VOCs
Note: NE = Not encountered						

Building 4 soil and wipe sample analytical results are summarized in the following tables.

BUILDING 4 SOIL SAMPLE ANALYTICAL RESULTS FOR VOCs					
Analytical Parameter	Sample Numbers		CALM		
			Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	4SB-1, 1	4SS-1 (0.5)	Scenario A	Scenario C	
Acetone	0.017	0.85	2,700	8,660	14
Vinyl Chloride	0.0025	ND	0.24	0.54	0.016
2-Butanone	ND	0.51	NL	NL	NL
Notes: ND = Not detected NL = Not listed in CALM All values are presented in mg/kg.					

BUILDING 4 SOIL SAMPLE ANALYTICAL RESULTS FOR SVOCs AND PCBs					
Analytical Parameter	Sample Numbers		CALM		
			Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	4SB-1, 0-3	4SS-1, 0-0.5	Scenario A	Scenario C	
Anthracene	0.037	ND	21,000	69,000	16,700
Benzo(a)anthracene	0.18	ND	1.1	4.2	4.7
Benzo(a)pyrene	0.17	ND	0.16	0.63	130
Benzo(b)fluoranthene	0.15	ND	0.94	3.7	15
Benzo(k)fluoranthene	0.12	ND	8	32	150
Chrysene	0.19	ND	36	143	470
Fluoranthene	0.38	ND	600	1,900	4,480
Indeno(1,2,3-cd)pyrene	0.13	ND	2.9	11	41

Phenanthrene	0.14	ND	NL	NL	NL
Pyrene	0.36	ND	2,100	6,900	4,480
Bis(2-ethylhexyl)phthalate	0.19	ND	200	200	70
PCBs	ND	17	0.6	2.5	NL
Notes: ND = Not detected NL = Not listed in CALM All values are presented in mg/kg.					

BUILDING 4 WIPE SAMPLE ANALYTICAL RESULTS FOR PCBs		
Sample Number	**Sampling Location**	**PCB Concentration**
4SW-1	Indoor electrical equipment stain	0.0101
4SW-1A	Outdoor transformer pad stain (west)	ND
4SW-1B	Outdoor transformer pad stain (east)	0.014
Notes: ND = Not detected CALM criterion for wipe samples: PCB = 0.010 mg/100 cm^2 All values are presented in mg/100 cm^2.		

Soil samples collected at Building 4 did not contain concentrations of VOCs or PCBs that exceed CALM criteria. A soil sample collected from 4SB-1 contained a benzo(a)pyrene concentration that slightly exceeds the CALM Scenario A criterion but does not exceed the Scenario C criterion. The soil sampled is confined to a concrete-lined pit. Wipe samples 4SW-1 and 4SW-1B contained PCB concentrations that exceed the CALM criterion of 10 μg/100 cm^2.

12.2.5 Building 5 Results

Two soil borings (5SB-1 and 5SB-2) were completed and sampled near Building 5. Also, five wipe samples (5SW-1, 5SW-A, and 5SW-1A through 5SW-1C) were collected from the elevator penthouse. The soil borings were completed and sampled to assess soil quality south of Building 5. The wipe samples were collected to assess the PCB content of oils spilled in the elevator penthouse. Sampling locations are depicted in Figure 12-4. Soil boring and headspace analysis results are summarized below.

BUILDING 5 SOIL BORING RESULTS						
Boring Number	Total Depth (feet bgs)	Fill (feet bgs)	Clayey Silt (feet bgs)	Silty Clay (feet bgs)	Depth to Groundwater (feet bgs)	Sampled Interval and Analytical Parameters
5SB-1	10	0-1	1-8	8-10	NE	4 to 6 feet bgs for SVOCs, PCBs, explosives, metals, phosphorus, and perchlorates 5 feet bgs for VOCs
5SB-2	10	0-1	1-8	8-10	9	0 to 2 feet bgs for SVOCs, PCBs, explosives, metals, phosphorus, and perchlorates 1 foot bgs for VOCs
Note: NE = Not encountered						

BUILDING 5 HEADSPACE ANALYSIS RESULTS					
Boring Number	1 foot bgs	3 feet bgs	5 feet bgs	7 feet bgs	9 feet bgs
5SB-1	10.8	12.1	24.7	9.7	7.3
5SB-2	46	9.6	6.6	3.1	5.7
Notes: NS = Not sampled All values are presented in ppm.					

Building 5 soil and wipe sample detected analytical results are summarized below.

BUILDING 5 SOIL SAMPLE ANALYTICAL RESULTS FOR SVOCs AND METALS					
			CALM		
	Sample Numbers		Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
Analytical Parameter	5SB-1, 4-6	5SB-2, 0-2	Scenario A	Scenario C	
Acenaphthene	ND	0.15	4,200	14,000	1,190
Anthracene	0.09	0.28	21,000	69,000	16,700
Benzo(a)anthracene	0.17	1.3	1.1	4.2	4.7
Benzo(a)pyrene	0.14	1.2	0.16	0.63	130
Benzo(b)fluoranthene	0.12	1.3	0.94	3.7	15
Benzo(g,h,i)perylene	ND	0.75	NL	NL	NL
Benzo(k)fluoranthene	0.12	1.2	8	32	150
Chrysene	0.16	1.7	36	143	470
Fluoranthene	0.49	4.1	600	1,900	4,480
Indeno(1,2,3-cd)pyrene	ND	0.87	2.9	11	41
Phenanthrene	0.39	2.4	NL	NL	NL
Pyrene	0.42	3.6	2,100	6,900	4,480
Bis(2-ethylhexyl)phthalate	0.085	0.19	200	200	70
Dibenzofuran	ND	0.057	NL	NL	NL
Carbazole	ND	0.36	NL	NL	290

BUILDING 5 SOIL SAMPLE ANALYTICAL RESULTS FOR SVOCs AND METALS					
			CALM		
	Sample Numbers		Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
Analytical Parameter	5SB-1, 4-6	5SB-2, 0-2	Scenario A	Scenario C	
Antimony	ND	ND	3.7	12	5.3
Cadmium	ND	ND	87	300	11
Chromium	17.7	21.7	1,300	2,700	38
Copper	19.5	25.7	1,100	4,700	NL
Lead	23.2	32.6	260	660	NL
Selenium	0.705	0.791	300	970	4.37
Thallium	ND	ND	17	61	29.1
Zinc	69.8	85.5	38,000	420,000	73,600
Nitrates	ND	3	NL	NL	NL
Phosphorus	290	350	NL	NL	NL

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 5 WIPE SAMPLE ANALYTICAL RESULTS FOR TOTAL PCBs		
Sample Number	Sampling Location	Total PCBs
5SW-1	Oil stain in elevator penthouse	0.0364
5SW-A	Field blank	ND
5SW-1A	Below pulley	0.010
5SW-1B	Southeast corner of elevator shaft	0.016
5SW-1C	Middle-east corner of elevator shaft (without stain)	0.0015

Notes:
ND = Not detected
CALM criterion for wipe samples: PCB = 0.010 mg/100 cm^2
All values are presented in mg/100 cm^2.

Soil samples collected from 5SB-1 and 5SB-2 did not contain concentrations of PCBs, VOCs, perchlorates, or explosives that exceed CALM criteria. The soil sample collected from 5SB-2 contained a benzo(a)pyrene concentration that exceeds CALM Scenario A and C criteria. The only source of benzo(a)pyrene at SLAAP would be fuel oil or quench oil, but Building 5 did not contain any process that used fuel oil or quench oil. Also, no staining, petroleum odors, or elevated headspace readings were identified during boring operations. It therefore seems unlikely that petroleum contamination was the source of the benzo(a)pyrene detected. Because the benzo(a)pyrene was detected on the surface of a

grassy area located in a heavily industrialized area, the most likely source of the benzo(a)pyrene is from a nearby industrial process generating air emissions. Two wipe samples (5SW-1 and 5SW-1B) collected from oil stains directly below the elevator equipment contained PCB concentrations exceeding the CALM criterion of 0.010 mg/100 cm^2. Because wipe samples collected around the oil-stained portion of the penthouse did not contain PCBs exceeding CALM criteria, the PCB contamination appears to be confined to the oil-stained areas below the elevator equipment.

12.2.6 Building 6 Results

Two soil borings (6SB-1 and 6SB-2) were completed and sampled at Building 6. Also, one surface soil sample (6SS-1) and three wipe samples (6SW-B1, 6SW-B2, and 6SW-B3) were collected from Building 6. The soil borings were completed and sampled to assess the quality of soil south of Building 6. The surface soil sample was collected to assess the ash in the open hearth on the first floor of the building. The wipe samples were collected to determine whether PCBs are present in the tunnel that connects SLOP to the basement of Building 6. The Building 6 sampling locations are depicted in Figure 12-4. Soil boring and headspace analysis results are summarized below.

BUILDING 6 SOIL BORING RESULTS

Boring Number	Total Depth (feet bgs)	Fill (feet bgs)	Clayey Silt (feet bgs)	Silty Clay (feet bgs)	Depth to Groundwater (feet bgs)	Sampled Interval and Analytical Parameters
6SB-1	12	0-4	4-8	8-12	9	4 to 6 feet bgs for SVOCs, PCBs, explosives, metals, phosphorus, perchlorates 5 feet bgs for VOCs
6SB-2	10	0-8	8-10	NE	9	2 to 4 feet bgs for SVOCs, PCBs, explosives, metals, phosphorus, perchlorates 3 feet bgs for VOCs

Note:
NE = Not encountered

BUILDING 6 HEADSPACE ANALYSIS RESULTS

Boring Number	1 foot bgs	3 feet bgs	5 feet bgs	7 feet bgs	9 feet bgs	11 feet bgs
6SB-1	118	61	193	94	60	31
6SB-2	120	758	80	148	42	NS

Notes:
NS = Not sampled
All values are presented in ppm.

Building 6 soil sample detected analytical results are summarized in the following tables.

BUILDING 6 SOIL SAMPLE ANALYTICAL RESULTS FOR METALS						
Analytical Parameter	Sample Numbers			CALM		
				Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	6SS-1, 0-0.5	6SB-1, 4-6	6SB-2, 2-4	Scenario A	Scenario C	
Antimony	ND	ND	0.00039	3.7	12	5.3
Arsenic	33	NA	NA	11	14	NL
Cadmium	1.85	ND	ND	87	300	11
Chromium	43.6	19.1	0.0121	1,300	2,700	38
Copper	86.1	19.1	0.0166	1,100	4,700	NL
Lead	1,450	25.5	40.5	260	660	NL
Mercury	6.3	NA	NA	69	250	320
Selenium	1.46	0.744	0.84	300	970	4.37
Silver	7.6	NA	NA	350	1,160	255
Thallium	ND	ND	ND	17	61	29.1
Zinc	1,260	70.1	0.061	38,000	420,000	73,600
Nitrates	NA	2	2	NL	NL	NL
Phosphorus	NA	470	430	NL	NL	NL

Notes:
NA = Not analyzed for
ND = Not detected
NL = Not listed in CALM
All results are presented in mg/kg.

BUILDING 6 SOIL SAMPLE ANALYTICAL RESULTS FOR VOCs				
Analytical Parameter	Sample Number	CALM		
		Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	6SB-1, 5	Scenario A	Scenario C	
Acetone	0.15	2,700	8,660	14
Trichloroethene	0.0015	NL	NL	NL
Vinyl chloride	0.0021	0.24	0.54	0.016
Toluene	0.0016	890	890	8.13
Carbon disulfide	0.0031	12	21	52

Notes:
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 6 SOIL SAMPLE ANALYTICAL RESULTS FOR SVOCs					
			CALM		
	Sample Numbers		Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
Analytical Parameter	**6SB-1, 4-6**	**6SB-2, 2-4**	**Scenario A**	**Scenario C**	
Anthracene	ND	0.041	21,000	69,000	16,700
Benzo(a)anthracene	0.59	0.17	1.1	4.2	4.7
Benzo(a)pyrene	0.061	0.150	0.16	0.63	130
Benzo(b)fluoranthene	0.065	0.4	0.94	3.7	15
Benzo(k)fluoranthene	0.042	0.098	8	32	150
Chrysene	0.066	0.19	36	143	470
Fluoranthene	0.11	0.3	600	1,900	4,480
Indeno(1,2,3-cd)pyrene	ND	0.098	2.9	11	41
Phenanthrene	0.06	0.21	NL	NL	NL
Pyrene	0.11	0.3	2,100	6,900	4,480
Bis(2-ethylhexyl)phthalate	0.65	ND	200	200	70

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

Building 6 soil samples did not contain concentrations of VOCs, SVOCs, explosives, or perchlorates exceeding CALM criteria. The surface soil sample (6SS-1) collected from the ash in the hearth contained concentrations of arsenic and lead that exceed CALM Scenario A and C criteria and a chromium concentration exceeding CALM leaching to groundwater pathway. The wipe samples did not contain detectable PCB concentrations.

12.2.7 Building 7 Results

One soil boring (7SB-1) was completed and sampled near Building 7. The soil boring was completed to 3 feet bgs in order to assess the quality of soil underneath the boiler blowdown discharge. This sampling location is depicted in Figure 12-4. The soil boring results are summarized below.

BUILDING 7 SOIL BORING RESULTS			
Boring Number	**Total Depth (feet bgs)**	**Clayey Silt (feet bgs)**	**Sampled Interval and Analytical Parameters**
7SB-1	3	0-3	1 to 3 feet bgs for total chromium

The soil sample collected contained 26 mg/kg of chromium. This concentration does not exceed CALM criteria.

12.2.8 Building 8 and 8A Results

For Buildings 8 and 8A, 10 soil borings (8SB-1 through 8SB-10) were completed and sampled during the first phase of field activities. Soil boring 8SB-11 was completed and sampled during the second phase of field activities. Soil borings 8SB-1 through 8SB-6 were completed to assess the quality of soils in the former fuel oil storage area. Soil borings 8SB-7 and 8SB-8 were completed to assess the quality of soils at the former "dirty sump" locations. Soil borings 8SB-9 and 8SB-10 were completed to assess soils along the fuel oil delivery lines. Soil boring 8SB-11 was completed to determine the horizontal extent of contamination visually detected in 8SB-4. Sampling locations are depicted in Figure 12-4. Soil boring and headspace analysis results are summarized below.

BUILDING 8 SOIL BORING RESULTS						
Boring Number	**Total Depth (feet bgs)**	**Fill (feet bgs)**	**Clayey Silt (feet bgs)**	**Silty Clay (feet bgs)**	**Depth to Groundwater (feet bgs)**	**Sampled Interval and Analytical Parameters**
8SB-1	12	0-5.5	5.5-8	8-12	11	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
8SB-2	12	0-6	NE	6-12	10	4 to 6 feet bgs for SVOCs and PCBs 5 feet bgs for VOCs
8SB-3	12	0-5	5-12	NE	10	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
8SB-4	10	0-6	NE	6-10	NE	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
8SB-5	12	0-5.5	NE	5.5-12	9	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
8SB-6	12	0-6	NE	6-12	10	6 to 7.5 feet bgs for VOCs 6.5 feet bgs for VOCs
8SB-7	12	0-6	6-12	NE	8	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
8SB-8	12	0-0.5	0.5-12	NE	7	5 to 7 feet bgs for SVOCs and PCBs 6 feet bgs for VOCs
8SB-9	16	0-2	NE	2-16	NE	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
8SB-10	12	0-0.5	0.5-5	5-12	10	6 to 7 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs

BUILDING 8 SOIL BORING RESULTS						
Boring Number	**Total Depth (feet bgs)**	**Fill (feet bgs)**	**Clayey Silt (feet bgs)**	**Silty Clay (feet bgs)**	**Depth to Groundwater (feet bgs)**	**Sampled Interval and Analytical Parameters**
8SB-11	16	0-4.5	4.5-16	NE	4.5	0 to 2 and 4 to 6 feet bgs for SVOCs and PCBs 1 and 5 feet bgs for VOCs

Note:
NE = Not encountered
Black staining was encountered at 6 feet bgs in 8SB-4.

BUILDING 8 HEADSPACE ANALYSIS RESULTS								
Boring Number	**1 foot bgs**	**3 feet bgs**	**5 feet bgs**	**7 feet bgs**	**9 feet bgs**	**11 feet bgs**	**13 feet bgs**	**15 feet bgs**
8SB-1	NM	22.97	49.63	85.53	71.54	84.43	NS	NS
8SB-2	NM	40.15	85.43	59.89	31.74	NM	NS	NS
8SB-3	NM	41.68	49.73	35.21	22.93	25.41	NS	NS
8SB-4	NM	22.35	82.74	121	20.37	NS	NS	NS
8SB-5	NM	60.51	61.74	69.73	38.42	53.71	NS	NS
8SB-6	NM	38.39	37.54	40.02	34.32	35.01	NS	NS
8SB-7	NM	23.21	33.42	36.81	22.97	21.70	NS	NS
8SB-8	NM	35.55	43.52	31.72	NS	NS	NS	NS
8SB-9	NM	37.77	46	112	33.06	71.53	26.43	24.21
8SB-10	NM	41.78	42.15	43.85	28.52	28.12	NS	NS
8SB-11	112	59	92	20	95	49	30	NS

Note:
NM = Not measured
NS = Not sampled
All values are presented in ppm.

Building 8 soil sample analytical results are summarized below.

BUILDING 8 SOIL SAMPLE ANALYTICAL RESULTS FOR VOCs

Analytical Parameter	Sample Numbers								CALM		
									Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	8SB-1, 7	8SB-2, 5	8SB-3, 5	8SB-4, 7	8SB-7, 7	8SB-9, 7	8SB-10, 7	8SB-11, 7	Scenario A	Scenario C	
Acetone	0.4	0.94	0.05	0.32	0.033	0.057	0.046	0.042	2,700	8,660	14
Benzene	ND	ND	ND	0.11	ND	ND	ND	ND	7.6	16	0.057
2-Butanone	ND	ND	ND	ND	ND	ND	ND	0.00853	NL	NL	NL
Ethylbenzene	ND	ND	ND	1.1	ND	ND	ND	ND	1,460	1,460	55
2-Hexanone	0.53	ND	ND	ND	ND	ND	ND	ND	NL	NL	NL
Methyl ethyl ketone	0.52	ND	ND	ND	ND	ND	ND	ND	NL	NL	NL
2-Methyl-2-pentanone	0.13	ND	ND	ND	ND	ND	ND	ND	NL	NL	NL
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	0.0024	0.24	0.54	0.016
Toluene	ND	ND	ND	0.83	ND	ND	ND	ND	890	890	8.13
Total xylenes	ND	ND	ND	5	ND	ND	ND	ND	12	21	52

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 8 SOIL SAMPLE ANALYTICAL RESULTS FOR SVOCs

Analytical Parameter	Sample Numbers											CALM		
												Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
	8SB-1, 6-8	8SB-2, 4-6	8SB-3, 6-8	8SB-4, 6-8	8SB-5, 6-8	8SB-6, 6-7.5	8SB-7, 6-8	8SB-8, 5-7	8SB-9, 6-8	8SB-10, 6-8	8SB-11, 6-8	Scenario A	Scenario C	
Anthracene	ND	ND	ND	8.5	ND	ND	ND	ND	ND	ND	ND	21,000	69,000	16,700
Benzo(a)anthracene	ND	0.5	ND	7.4	ND	ND	ND	ND	ND	ND	ND	1.1	4.2	4.7
Benzo(a)pyrene	ND	ND	ND	4.6	ND	ND	ND	ND	ND	ND	ND	0.16	0.63	130
Chrysene	ND	0.62	ND	11	ND	ND	ND	ND	ND	ND	0.046	36	143	470
Fluoranthene	ND	0.42	ND	3.6	ND	ND	ND	ND	ND	ND	0.063	600	1,900	4,480
Fluorene	ND	ND	ND	5.1	ND	ND	ND	ND	ND	ND	ND	2,800	9,300	940
2-Methylnaphthalene	ND	0.42	ND	57	ND	ND	ND	ND	ND	ND	ND	NL	NL	NL
Naphthalene	ND	ND	ND	14	ND	ND	ND	ND	ND	ND	ND	970	3,100	5.3
Phenanthrene	ND	ND	ND	40	ND	ND	ND	ND	ND	ND	ND	NL	NL	NL
Pyrene	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	0.067	2,100	6,900	4,480

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

Except for the soil sample collected from 8SB-4, soil samples collected at Buildings 8 and 8A did not contain VOC or SVOC concentrations that exceed CALM criteria. The soil sample from 8SB-4 contained concentrations of benzene, benzo(a)anthracene, and naphthalene that exceed the CALM leaching to groundwater pathway criteria. The soil sample from 8SB-4 also contained concentrations of benzo(a)anthracene and benzo(a)pyrene that exceed CALM Scenario A and C criteria. No soil sample contained detectable PCB concentrations.

12.2.9 Building 9 and 9A through 9D Results

For Buildings 9 and 9A through 9D, one soil boring (10SB-5) was completed and sampled in the sludge pit area to assess soil quality. The soil boring location is shown in Figure 12-4. Soil boring and headspace analysis results are summarized below.

BUILDING 9 AND 9A THROUGH 9D SOIL BORING RESULTS						
Boring Number	**Total Depth (feet bgs)**	**Fill (feet bgs)**	**Clayey Silt (feet bgs)**	**Silty Clay (feet bgs)**	**Depth to Groundwater (feet bgs)**	**Sampled Interval and Analytical Parameters**
10SB-5	12	0-3.5	3.5-12	NE	8.5	6 to 8 feet bgs for pH, SVOCs, and PCBs 7 feet bgs for VOCs
Note: NE = Not encountered						

BUILDING 9 AND 9A THROUGH 9D HEADSPACE ANALYSIS RESULTS						
Boring Number	**1 foot bgs**	**3 feet bgs**	**5 feet bgs**	**7 feet bgs**	**9 feet bgs**	**11 feet bgs**
10SB-5	NM	42.60	23.11	47.81	32.1	NM
Notes: NM = Not measured All values are presented in ppm.						

The soil samples collected from 9SB-1 (10SB-5) did not contain concentrations of VOCs, PCBs, or SVOCs that exceed CALM criteria. The analytical results are summarized in Section 12.2.10. Also, the soil pH did not indicate that the soil was hazardous.

12.2.10 Building 10 Results

A total of six soil borings (10SB-1 through 10SB-5 and 10SB-1A) were completed and sampled near Building 10. Soil boring 10SB-1 was converted into a monitoring well (10MW-1). Soil borings 10SB-1 through 10SB-5 were completed to assess the horizontal extent of contamination from the quench oil

release reported during the UST removals. Soil boring 10SB-1A was completed to assess soil in the vicinity of the quench oil sludge pit. Monitoring well 10MW-1 was installed to assess the quality of groundwater hydraulically downgradient from Building 10. Sampling locations are shown in Figure 12-4. Soil boring and headspace analysis results are summarized below.

BUILDING 10 SOIL BORING RESULTS						
Boring Number	**Total Depth (feet bgs)**	**Fill (feet bgs)**	**Clayey Silt (feet bgs)**	**Silty Clay (feet bgs)**	**Depth to Groundwater (feet bgs)**	**Sampled Interval and Analytical Parameters**
10SB-1	20	0-0.5	0.5-20	NE	6	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
10SB-1A	19	0-13	13-19	NE	12	14 to 16 feet bgs for SVOCs, metals, and explosives 15 feet bgs for VOCs
10SB-2	12	0-1	1-12	NE	9	6 to 8 feet bgs for SVOCs 7 feet bgs for VOCs
10SB-3	12	0-2	NE	2-12	9	10 to 12 feet bgs for SVOCs 11 feet bgs for VOCs
10SB-4	16	0-2	4-16	2-4	9	6 to 8 feet bgs for SVOCs and PCBs 7 feet bgs for VOCs
10SB-5	12	0-3.5	3.5-12	NE	8.5	6 to 8 feet bgs for SVOCs, PCBs, and pH 7 feet bgs for VOCs

Note:
NE = Not encountered

BUILDING 10 HEADSPACE ANALYSIS RESULTS								
Boring Number	**1 foot bgs**	**3 feet bgs**	**5 feet bgs**	**7 feet bgs**	**9 feet bgs**	**11 feet bgs**	**13 feet bgs**	**15 feet bgs**
10SB-1	19.5	24.5	18.2	22.4	22.9	13.8	18.5	18.3
10SB-1A	75	87	NM	37.5	NM	39.6	NM	68
10SB-2	NM	24.75	26.74	30.22	22.41	27.79	NS	NS
10SB-3	NM	74.03	19.21	31.41	7.05	NM	NS	NS
10SB-4	NM	29.78	23.52	27.42	34.24	36.1	24.52	23.79
10SB-5	NM	41.60	23.11	47.81	32.10	NM	NS	NS

Notes:
NM = Not measured because of poor soil recovery
NS = Not sampled
All values are presented in ppm.

Building 10 soil sample analytical results are summarized below.

BUILDING 10 SOIL SAMPLE ANALYTICAL RESULTS FOR VOCs									
	Sample Numbers						CALM		
							Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
Analytical Parameter	10SB-1, 7	10SB-1A, 15	10SB-2,7	10SB-3, 7	10SB-4,11	10SB-5, 7	Scenario A	Scenario C	
Acetone	ND	0.4	0.035	ND	0.05	0.046	2,700	8,660	14
Benzene	ND	0.0014	ND	ND	ND	ND	7.6	16	0.057
2-Butanone	ND	0.007	ND	ND	ND	ND	NL	NL	NL
Ethylbenzene	ND	0.0021	ND	ND	ND	ND	1,460	1,460	55
Chlorobenzene	ND	0.0021	ND	ND	ND	ND	46	109	2.2
Trichloroethene	ND	0.0017	ND	ND	ND	ND	37	52	0.097
Tetrachloroethene	ND	0.0024	ND	ND	ND	ND	49	160	0.42
Styrene	ND	0.0017	ND	ND	ND	ND	2,120	2,120	13.5
Carbon disulfide	ND	0.0034	ND	ND	ND	ND	12	21	52
Vinyl chloride	ND	0.0029	ND	ND	ND	ND	0.24	0.54	0.016
Toluene	ND	0.0021	ND	ND	ND	ND	890	890	8.13
Total xylenes	ND	0.007	ND	ND	ND	ND	12	21	52

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

BUILDING 10 SOIL SAMPLE ANALYTICAL RESULTS FOR SVOCs AND METALS									
	Sample Numbers						CALM		
							Ingestion/Dermal Contact Inhalation Pathway		Leaching to Groundwater Pathway
Analytical Parameter	10SB-1, 6-8	10SB-1A, 14-16	10SB-2, 6-8	10SB-3, 10-12	10SB-4, 6-8	10SB-5, 6-7.5	Scenario A	Scenario C	
Fluoranthene	ND	0.79	ND	3.6	ND	ND	600	1,900	4,480
Phenanthrene	ND	0.063	ND	40	ND	ND	NL	NL	NL
Phosphorus	ND	430	ND	ND	ND	ND	NL	NL	NL
Pyrene	ND	0.0074	ND	ND	ND	ND	2,100	6,900	4,480
Nitrate	ND	2	ND	ND	ND	ND	NL	NL	NL

Notes:
ND = Not detected
NL = Not listed in CALM
All values are presented in mg/kg.

With the exception of 0.37 mg/l of phosphorus, the groundwater sample collected from 10MW-1 did not contain detectable concentrations of contaminants. The soil samples collected from soil borings did not contain contaminant concentrations exceeding CALM criteria.

13.0 CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the conclusions drawn from the findings of the EBS conducted at SLAAP and presents recommendations for future activities at the installation.

13.1 SITEWIDE CONCLUSIONS AND RECOMMENDATIONS

This section presents conclusions and recommendations for sitewide groundwater, ACM, and LBP.

13.1.1 Conclusions and Recommendations for Sitewide Groundwater

Groundwater elevation data indicates that groundwater flows to the SLAAP installation from the west and then flows radially off the SLAAP installation to the north, east, and south. Groundwater flow rates measured during groundwater sampling activities indicate that the saturated formations in the subsurface are not capable of supplying potable water. Groundwater samples collected from the seven sitewide monitoring wells did not contain concentrations of VOCs, SVOCs, metals, explosives, PCBs, or perchlorates that exceed CALM groundwater target concentrations. Because the groundwater does not appear to have been impacted by off-installation or installation activities, the groundwater entering and leaving the installation does not appear to be of environmental concern.

13.1.2 Conclusions and Recommendations for Asbestos-Containing Material

The ACM survey conducted at SLAAP indicated the presence of ACM throughout the major buildings of the installation. The ACM survey report is included in this EBS report as Appendix J. Because the ACM poses an environmental concern, the ACM should be addressed in accordance with NESHAP regulations.

13.1.3 Conclusion and Recommendations for Lead-Based Paint

Because of the age of the building, LBP appears to be present in various buildings at SLAAP and poses an environmental concern. SLAAP buildings scheduled for renovation or demolition should be inspected for LBP.

13.2 BUILDING-SPECIFIC CONCLUSIONS AND RECOMMENDATIONS

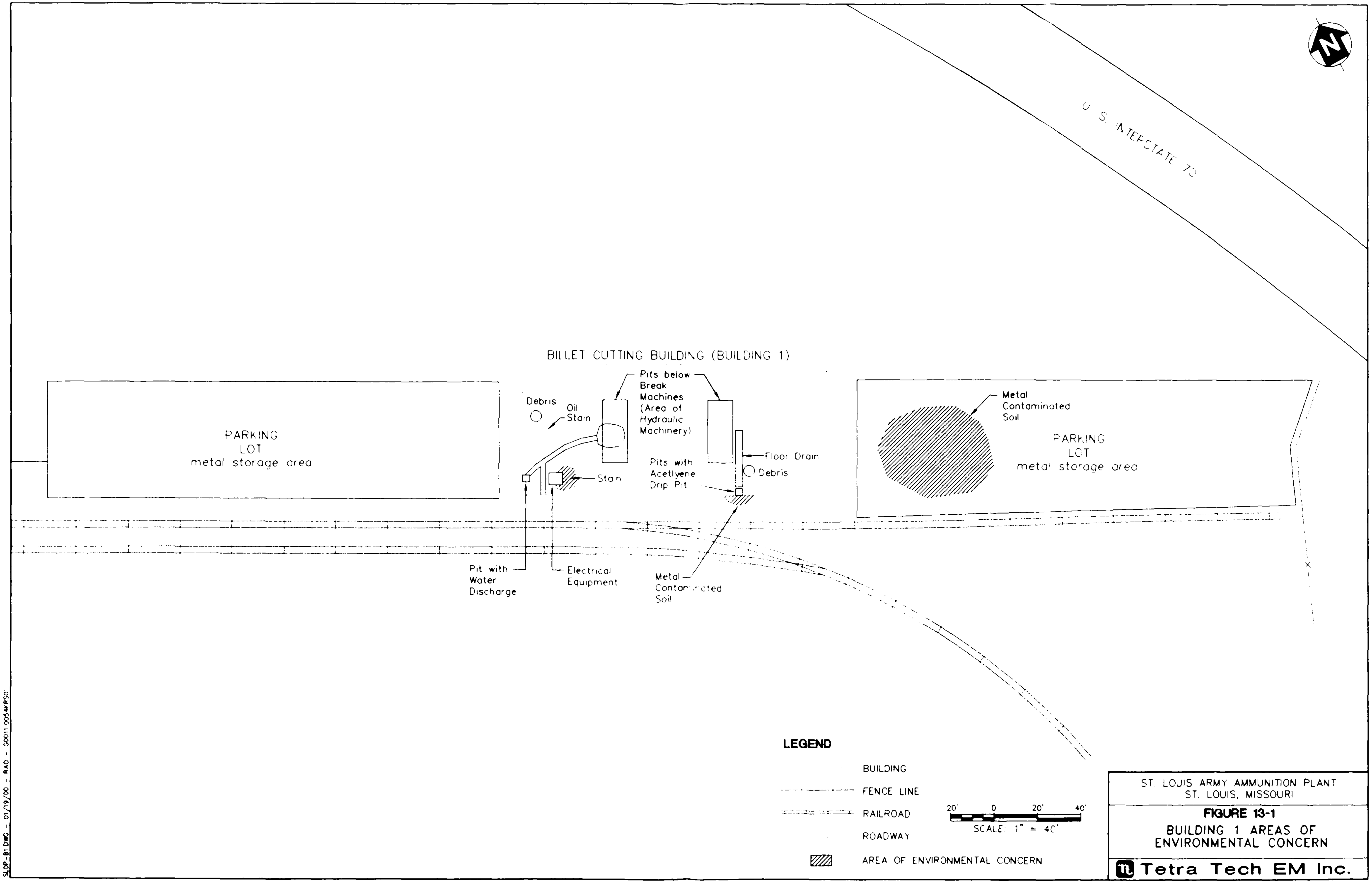
This section presents building-specific findings of the EBS and associated recommendations.

13.2.1 Building 1 Conclusions and Recommendations

EBS investigations of Building 1 included collection of two wipe samples and advancement and sampling of four soil borings. Wipe samples collected from Building 1 indicate that the oil stain on the west side of the building does not contain PCBs; therefore, the oil stain does not appear to be hazardous and does not pose an environmental concern. The oil stain on the concrete below the electrical equipment contained an elevated PCB concentration, indicating that the electrical equipment may hold PCB-containing oil. Therefore, this area poses an environmental concern. The equipment is scheduled to be removed. The stained concrete should be decontaminated to remove the residual PCBs. One soil sample collected from the soil boring completed near the west sewer connection and the soil sample collected from the east parking lot contained lead concentrations that exceed CALM ingestion/dermal contact inhalation criteria. Also, these soil samples contained chromium concentrations that exceed the CALM leaching to groundwater pathway criterion. Therefore, the areas sampled pose an environmental concern. The extent of soil contamination in these areas should be delineated, and the impermeable barrier present at SLAAP should be maintained. Also, miscellaneous rubbish, debris, and LBP chips in Building 1 should be removed. The areas of environmental concern for Building 1 are depicted in Figure 13-1.

13.2.2 Building 2 Conclusions and Recommendations

EBS investigation activities completed at Building 2 included completion of one monitoring well and collection of two surface soil samples, one wipe sample, two sump water samples, and groundwater samples. The surface soil samples contained metal concentrations exceeding CALM criteria. Therefore, the soil material in the building appears to pose an environmental concern. This area of environmental concern is depicted in Figure 13-2. The soil material should be analyzed for waste characterization parameters and then properly disposed of. The wipe sample collected from the oil stain did not contain PCB concentrations exceeding CALM criteria. Therefore, the oil stain does not appear to be hazardous and does not pose an environmental concern. The groundwater samples collected from the monitoring

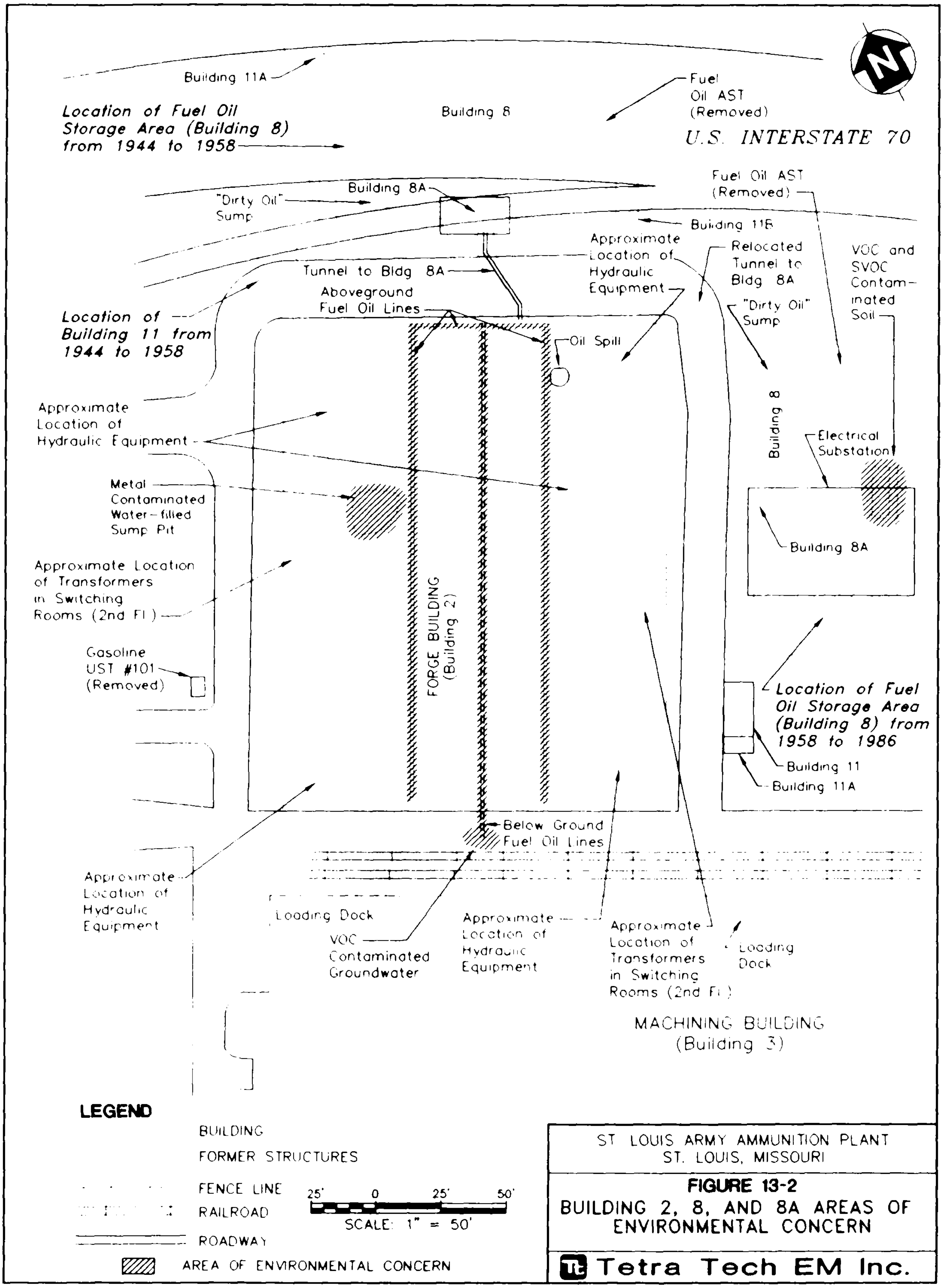


ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 13-1

BUILDING 1 AREAS OF ENVIRONMENTAL CONCERN

Tetra Tech EM Inc.



ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

FIGURE 13-2
BUILDING 2, 8, AND 8A AREAS OF ENVIRONMENTAL CONCERN

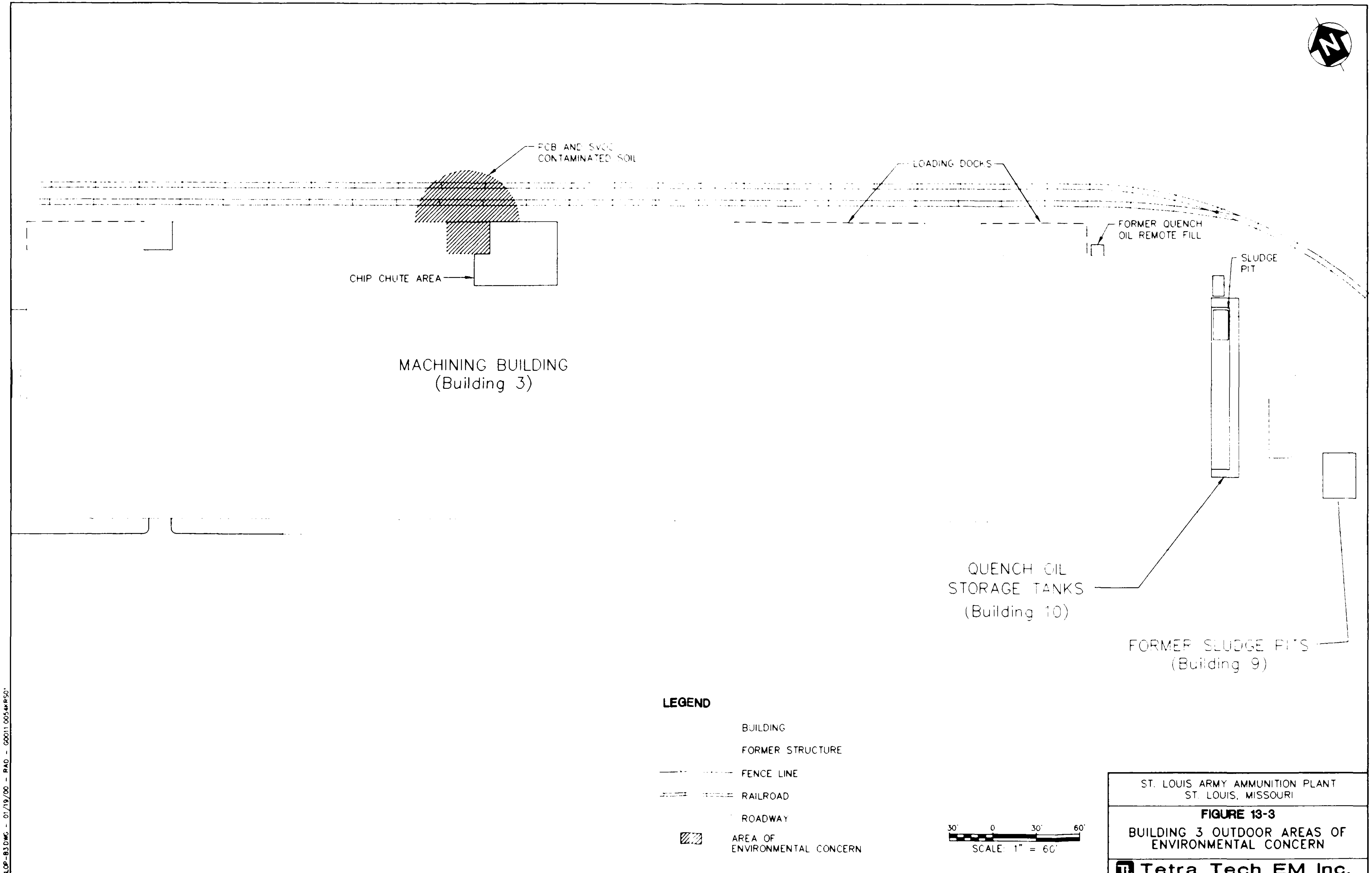
Tetra Tech EM Inc.

well contained concentrations of 1,1-dichloroethene that exceed the CALM groundwater target concentration. Therefore, the groundwater in the Building 2 area poses an environmental concern. However, the maximum 1,1-dichloroethene concentration detected exceeds the CALM groundwater target concentration by only 49 μg/L. Also, groundwater is not in use at SLAAP or in St. Louis, and groundwater samples collected from the sitewide monitoring wells did not contain detectable concentrations of 1,1-dichloroethene. It is therefore recommended that no additional groundwater characterization be completed.

13.2.3 Building 3 Conclusions and Recommendations

EBS investigation activities completed at Building 3 included completion and sampling of four soil borings and collection of 17 concrete core samples, 44 wipe samples, 23 surface soil samples, and 6 air samples. The soil sample collected from soil boring 3SB-3 contained concentrations of PCBs and SVOCs that exceed CALM criteria. Therefore, the vicinity of 3SB-3 is an area of environmental concern (see Figure 13-3). The soil boring was completed in the vicinity of the conveyor that transported metal chips from the chip chute to railroad cars. Therefore, it appears that the source of the contamination was spillage in the chip chute area. The concrete core samples collected from the basement and first-floor chip chute walls contained PCB concentrations that exceed CALM criteria; therefore, these areas pose an environmental concern. The core samples collected from the second floor and from concrete foundation members throughout the basement did not contain PCB concentrations that exceed CALM criteria. Wipe samples collected from the concrete portion of the basement indicate that surficial PCB contamination is present throughout the concrete portion (see Figure 13-4). Wipe samples collected from visibly stained areas of the concrete structures had PCB concentrations exceeding CALM criteria. The PCB contamination source was leakage from soluble oil piping and from holes in the ceiling of the basement. Except for one surface soil sample collected from the basement, the surface soil samples collected at Building 3 contained PCB concentrations below CALM criteria. Also, soil samples collected from the basement contained concentrations of metals and pesticides that did not exceed CALM criteria. The surface soil samples collected from the quench oil-stained portion of the basement did not contain PCBs and does not appear pose an environmental concern. The air samples collected in the east portion of the building contained pesticide concentrations that exceed U.S. EPA Region 9 PRGs for unrestricted use.

Recommendations for areas of environmental concern in Building 3 are listed below.


PCB AND SVOC CONTAMINATED SOIL
LOADING DOCKS
FORMER QUENCH OIL REMOTE FILL
SLUDGE PIT
CHIP CHUTE AREA
MACHINING BUILDING (Building 3)
QUENCH OIL STORAGE TANKS (Building 10)
FORMER SLUDGE PITS (Building 9)
LEGEND
BUILDING
FORMER STRUCTURE
FENCE LINE
RAILROAD
ROADWAY
AREA OF ENVIRONMENTAL CONCERN
30' 0 30' 60'
SCALE: 1" = 60'
ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI
FIGURE 13-3
BUILDING 3 OUTDOOR AREAS OF ENVIRONMENTAL CONCERN
Tetra Tech EM Inc.
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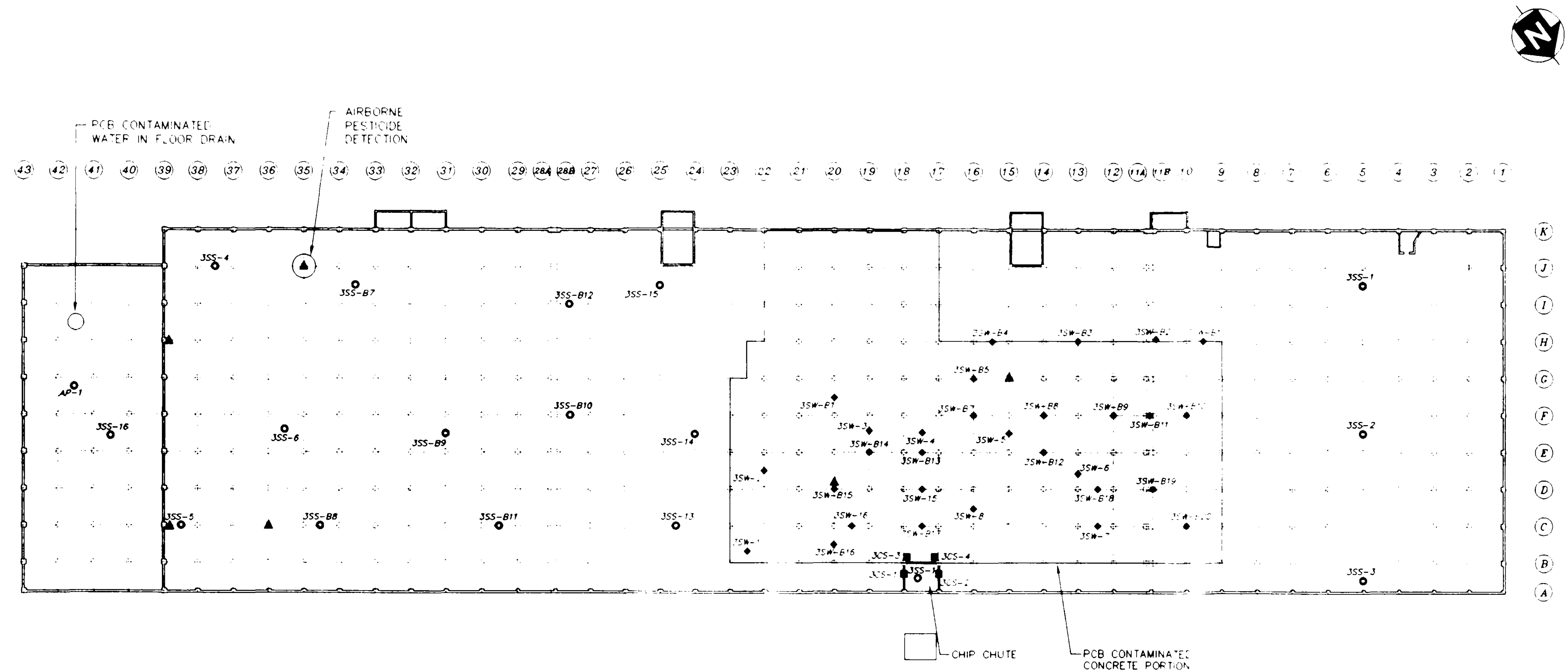


LEGEND

3SS-1 ○ SURFACE SOIL SAMPLE LOCATION

3SW-E1 ◆ SURFACE WIPE SAMPLE LOCATION

3SC-1 ■ CONCRETE CORE SAMPLE

▲ AIR SAMPLE LOCATION

AREA OF ENVIRONMENTAL CONCERN

ST LOUIS ARMY AMMUNITION PLANT
ST LOUIS, MISSOURI

FIGURE 13-4
BUILDING 3 BASEMENT
AREAS OF ENVIRONMENTAL CONCERN

Tetra Tech EM Inc.

SLAAP-BLDG3.DWG - 03/15/00 - PAO - G0011 0056OPFM00

- Soil borings should be completed and sampled in the vicinity of soil boring 3SB-3 to assess the vertical and horizontal extent of PCB and SVOC contamination.

- The paint and the concrete caps on the first and second floors of Building 3 should be repaired.

- The concrete portion of the basement should be decontaminated to remove PCBs.

- Core samples from the basement and first floor of the chip chute should be collected to assess the complete extent of contamination.

- Surface soil samples in the vicinity of 3SS-1 and 3SS-1A need to be collected to assess the extent of PCB-contaminated soils in the basement.

- The concrete and brick walls of the chip chute in the basement and on the first floor should be remediated to remove PCBs.

- The soil portion of the basement should be capped with clay to prevent airborne distribution of pesticides.

- The material in the separator tank should be characterized and disposed.

13.2.4 Building 4 Conclusions and Recommendations

At Building 4, the wipe samples collected from the oil stain below the electrical equipment and from the oil stain in the east transformer storage area contained PCB concentration exceeding CALM criteria. Therefore these areas pose an environmental concern (see Figure 13-5). The electrical equipment is to be removed. The stained areas below the electrical equipment and on the east transformer pad should be decontaminated to remove PCBs. Soil samples collected from the soil boring completed near the transformer pad did not contain PCB concentrations exceeding CALM criteria. Therefore, PCB contamination from transformers stored in this area does not pose an environmental concern. However, a soil sample collected from the soil boring did contain a concentration of benzo(a)pyrene that exceeds a CALM criterion by 0.01 mg/kg. Therefore, the soil in this area appears to pose an environmental concern. The only source of benzo(a)pyrene at SLAAP would be fuel oil or quench oil. Building 4 did not contain any process that used fuel oil or quench oil, and no staining, petroleum odors, or elevated headspace readings were identified during boring operations. Therefore, it seems unlikely that petroleum contamination was the source of the benzo(a)pyrene detected. Because the benzo(a)pyrene was detected on the surface of a grassy area located in a heavily industrialized area, the most likely source of the benzo(a)pyrene is an industrial process generating air emissions. The surface soil samples collected from the concrete-lined compressor pit contained concentrations of PCBs that exceed CALM criteria.

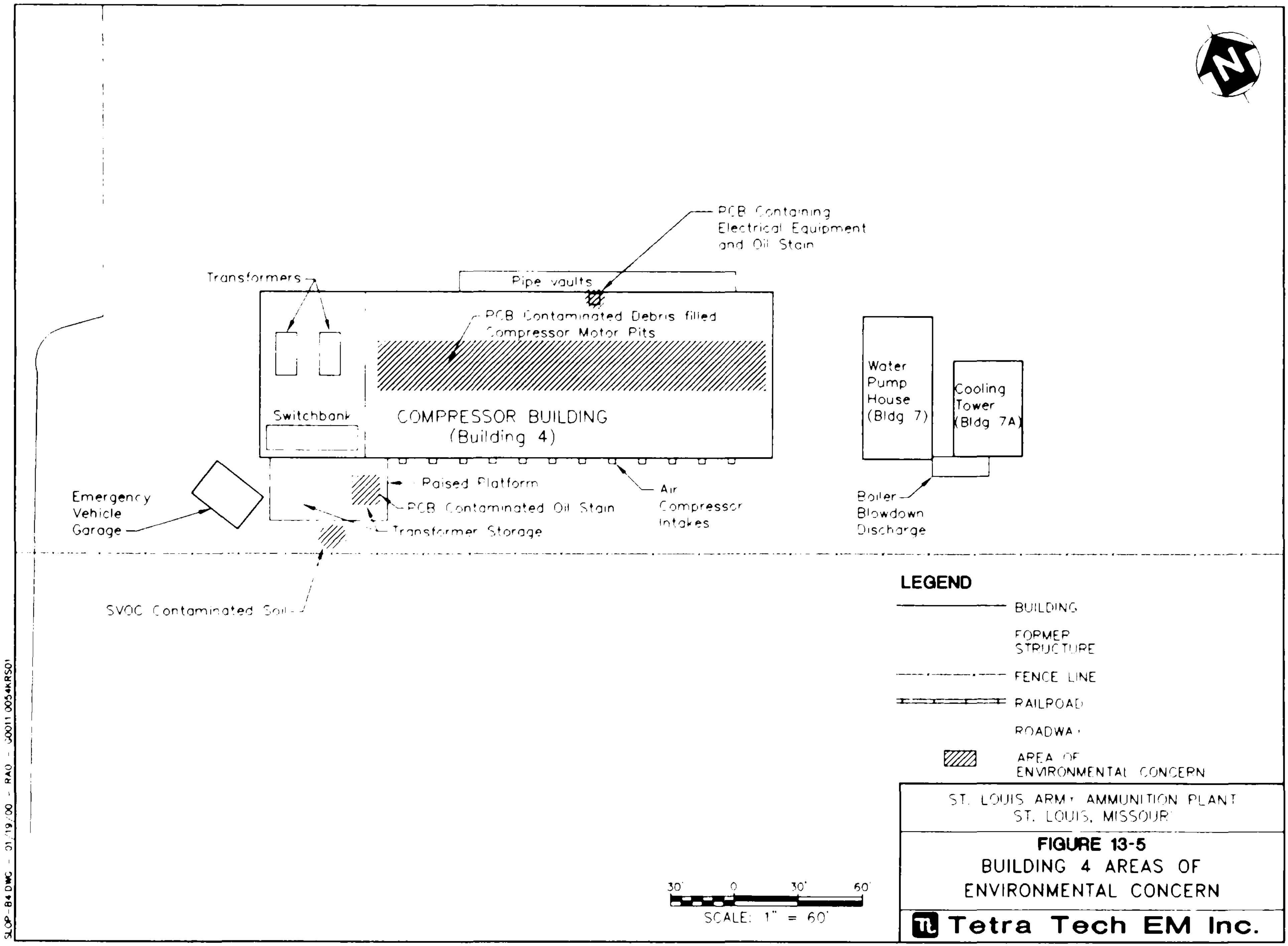


FIGURE 13-5
BUILDING 4 AREAS OF ENVIRONMENTAL CONCERN

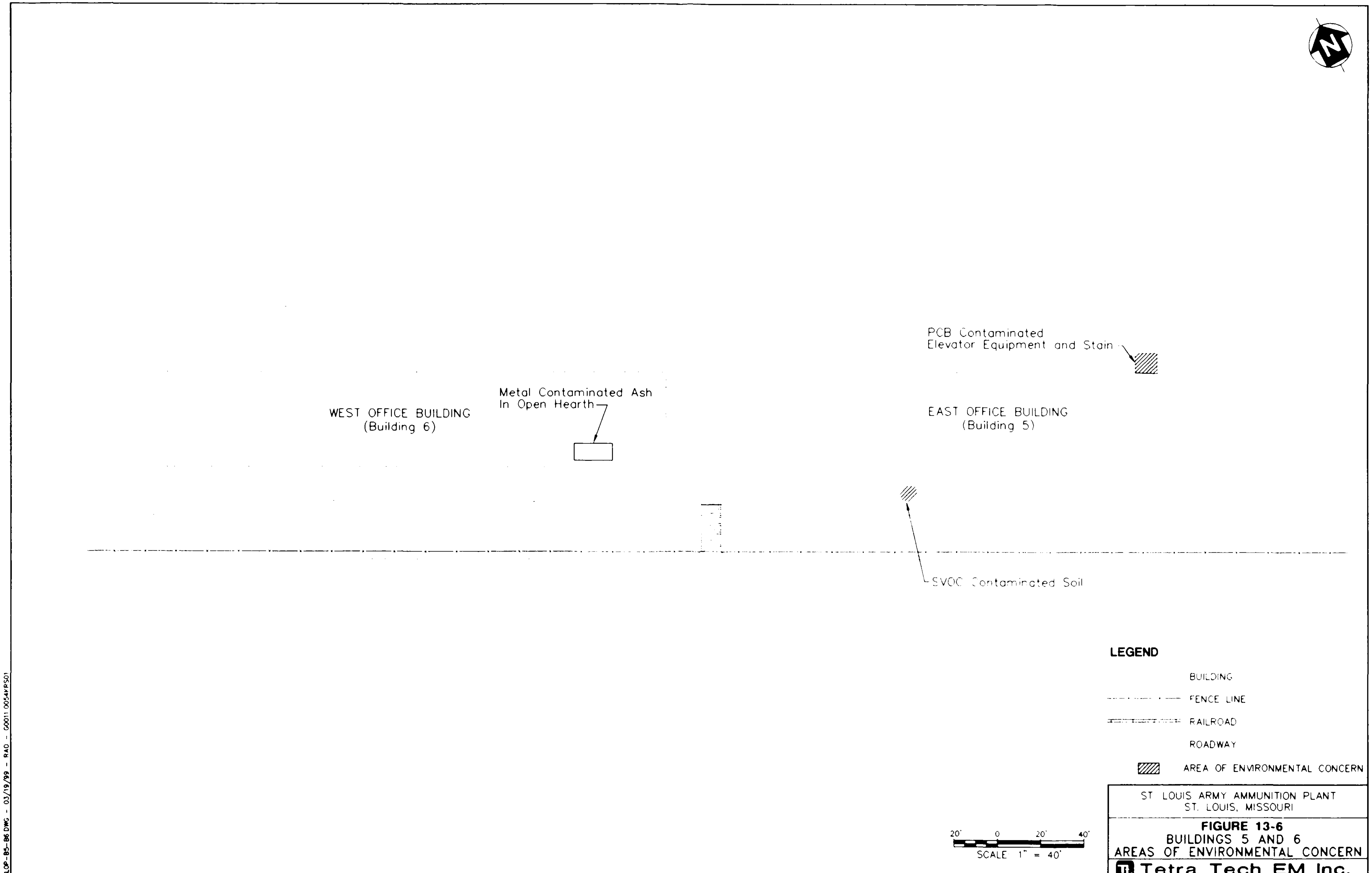
Therefore, this area poses an environmental concern. The soil and debris in the compressor pit should be removed and properly disposed of.

13.2.5 Building 5 Conclusions and Recommendations

At Building 5, wipe samples collected from the elevator penthouse indicate that PCB-containing oil is located beneath the elevator equipment. This material appears to pose an environmental concern, so the stained areas and elevator equipment should be decontaminated to remove the PCB-contaminated oil (see Figure 13-6). Soil samples collected from soil borings completed at Building 5 did not contain concentrations of explosives, perchlorates, metals, VOCs, or PCBs that exceed CALM criteria. However, the benzo(a)pyrene concentration in a soil sample collected from one soil boring did exceed CALM criteria. Therefore, the soil in the Building 5 area appears to pose an environmental concern. The only source of benzo(a)pyrene at SLAAP would be fuel oil or quench oil. Because Building 5 did not contain any process that used fuel oil or quench oil, and because no staining, petroleum odors, or elevated headspace readings were identified during boring operations, it seems unlikely that petroleum contamination was the source of the benzo(a)pyrene detected. Because the benzo(a)pyrene was detected on the surface of a grassy area located in a heavily industrialized area, the most likely source of the benzo(a)pyrene is an industrial process generating air emissions. Benzo(a)pyrene and other PAHs have been detected in other shallow soil borings advanced in the grassy areas next to Buildings 4, 5, and 6, which is further evidence that the PAH contamination is from an off-site source. Because the benzo(a)pyrene contamination appears to be a background condition, no further action appears to be warranted.

13.2.6 Building 6 Conclusions and Recommendations

Wipe samples collected from the tunnel in the basement of Building 6 did not contain detectable concentrations of PCBs; therefore, the tunnel does not appear to pose an environmental concern. Soil samples collected from soil borings completed south of Building 6 did not contain concentrations of VOCs, SVOCs, PCBs, metals, perchlorates, explosives, or propellants that exceed CALM criteria. PAHs were detected in shallow soil samples; however, the concentrations of these PAHs were below CALM criteria and are representative of background conditions. The soil sample collected from the hearth ash contained metal concentrations that exceed CALM criteria. The ash is confined to the hearth and poses an environmental concern (See Figure 13-6). The ash should be characterized, removed, and properly disposed of.


PCB Contaminated
Elevator Equipment and Stain
WEST OFFICE BUILDING
(Building 6)
Metal Contaminated Ash
In Open Hearth
EAST OFFICE BUILDING
(Building 5)
SVOC Contaminated Soil
LEGEND
BUILDING
FENCE LINE
RAILROAD
ROADWAY
AREA OF ENVIRONMENTAL CONCERN
20' 0 20' 40'
SCALE 1" = 40'
ST LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI
FIGURE 13-6
BUILDINGS 5 AND 6
AREAS OF ENVIRONMENTAL CONCERN
Tetra Tech EM Inc.
SLOP-B5-B6.DWG - 03/19/99 - RAO - G0011 0054PRS01

13.2.7 Building 7 Conclusions and Recommendations

At Building 7, the soil sample collected from the boiler blowdown discharge area did not contain a concentration of total chromium that exceeds CALM criteria; therefore, it appears that the fungicides used in the heating system did not have an adverse impact on the environment. This area does not appear to pose an environmental concern, and no further investigation appears to be warranted.

13.2.8 Building 8 and 8A Conclusions and Recommendations

Building 8 and 8A soil samples did not contain concentrations of PCBs that exceed CALM criteria. However, the soil sample collected from soil boring 8SB-4 exhibited staining and contained SVOC and VOC concentrations that exceed CALM criteria; therefore, this area poses an environmental concern. The stained soil was limited to the 4- to 5-foot bgs interval, which was the former grade of the tank farm. The soil borings completed north, east, south, and west of 8SB-4 did not contain SVOC or VOC concentrations exceeding CALM criteria; therefore, the vertical and horizontal extent of SVOC and VOC contamination in this area is known (see Figure 13-2). Groundwater samples collected from monitoring well SWMW-7, which is downgradient of 8SB-4, did not contain PCB, VOC, or SVOC concentrations that exceed CALM criteria, indicating that the contamination detected in 8SB-4 is not impacting the groundwater. Therefore, no further assessment appears to be warranted for this area.

13.2.9 Building 9 and 9A through 9D Conclusions and Recommendations

Building 9 and 9A through 9D soil samples collected from the sludge pit did not contain VOC, SVOC, or PCB concentrations that exceed CALM criteria. The pH of the soil sample collected from soil boring 10SB-5 was not hazardous; therefore, the sludge pits do not appear to have adversely impacted the environment. This area does not appear to pose an environmental concern, and therefore no further action in this area appears to be warranted.

13.2.10 Building 10 Conclusions and Recommendations

Soil samples collected from the soil borings completed around Building 10 and from the sludge tank area did not contain VOC, SVOC, metal, or PCB concentrations that exceed CALM criteria. Therefore, the sludge tank area does not pose an environmental concern, and it appears that no additional investigations of this area are warranted. The horizontal and vertical extent of soil contamination resulting from the

LUST has been determined. The groundwater sample collected from the monitoring well downgradient of the LUST impact area did not contain contaminant concentrations that exceed CALM criteria. Because the areal extent of soil contamination is known and groundwater contamination is not present, no further investigation appears to be warranted. A letter should be submitted to MDNR requesting that the LUST incident be closed.

13.2.11 Building 11, 11A, and 11B Conclusions and Recommendations

Buildings 11, 11A, and 11B, pose no environmental concerns; therefore, no further action appears to be warranted.

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